

Military & Aerospace Electronics

SEPTEMBER 2010 • VOL. 21 NO. 9

THE MAGAZINE OF TRANSFORMATION IN ELECTRONIC AND OPTICAL TECHNOLOGY

Post-FCS vetronics

DOD and industry seek to capitalize on Future Combat Systems technology to deliver the latest vetronics to warfighters in the field. **PAGE 16**

Switch fabrics

High-speed serial switch fabric networking for high-performance embedded parallel processing architectures take their places in demanding aerospace and defense applications. **PAGE 28**

Rugged radios

Designers of rugged radios focus on improving the warfighter network, while creating technologies that increase efficiencies in size, weight, and power. **PAGE 38**



WWW.MILAERO.COM





POWER BY DESIGN

Custom power solutions designed to fit your specific needs

Vicor Custom Power: Small company responsiveness, large company resources

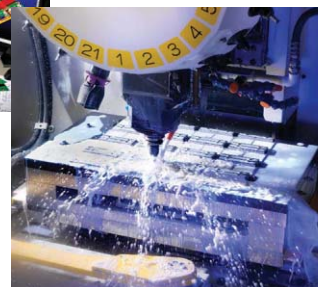
The sole focus of Vicor Custom Power is designing and manufacturing turnkey custom power systems that meet your specific needs. Vicor Custom Power maintains the flexibility of a small entrepreneurial company while taking advantage of Vicors technical and business resources to deal effectively with your most challenging power requirements. Vicor has invested in the tools and resources to offer you full service solutions from prototype to mass production with the shortest lead times and the lowest risk.

General Capabilities:

- Electrical and Mechanical Design
- Rapid Prototyping
- High Volume Production Capacity
- MIL-STDs Compliance
- Reliability / Certification Testing:

High Temperature Operational Life
HALT (Highly Accelerated Life Test)
Mechanical / Thermal Shock
Vibration
Humidity
Acceleration

Altitude
Explosive Atmosphere
Temperature Cycling
Burn In
EMI
Transient Immunity



Put Vicor Custom Power to work for you today, call 1-800-496-5570 to speak with a Vicor Custom Power engineer, or email apps@vicorcustom.com

vicorcustom.com

VICOR CUSTOM POWER

Intel® Core™ i7 Processor Solutions

Optimized For Embedded Computing Applications.

6U VPX • 3U VPX

6U cPCI • 3U cPCI

XMC • VME



X-ES Intel® Core™ i7 Processor Solutions: Unmatched Performance

Extreme Engineering Solutions, Inc. (X-ES) unleashes the performance of the Intel Core i7 processor for embedded computing. By utilizing a processor with integrated graphics, PCIe, and ECC DDR3 memory controllers, the X-ES solutions deliver unmatched power savings and processing performance for compute intensive commercial and military applications.

X-ES offers an extensive product portfolio that includes commercial and ruggedized single board computers, high-performance processor modules, multipurpose I/O modules, backplanes, enclosures, and fully integrated systems.

Intel Core i7 processor solutions available now in a variety of form factors.
Call or visit our website today.

X-ES
Extreme Engineering Solutions

608-833-1155 • www.x-es.com

Making Every Shot Count with OpenVPX

OpenVPX NOW



Leverage multi-vendor integration services for interoperability

Your complex applications require a top-down systems-level approach to interoperability. Mercury's Services and Systems Integration team ensures solid deployment of Ensemble™ Series OpenVPX™ solutions in your total environment, while reducing risks and introduction costs.

Why OpenVPX

- Interoperability ensures scalable, flexible solutions
- Migration with Mercury maintains high performance
- Mercury leadership kick-starts open standards
- Extensive product line deployed and available today



Visit mc.com/openvpxnow

Copyright © 2010 Mercury Computer Systems, Inc. Ensemble is a trademark of Mercury Computer Systems, Inc. and OpenVPX is a trademark of VITA.

SEPTEMBER 2010 • VOLUME 21, NUMBER 9

» CONTENTS

4 TRENDS

6 NEWS

6 IN BRIEF

16 SPECIAL REPORT

The vetronics landscape in a post-FCS world

Industry leaders and military officials forge ahead in the battle to install ever more innovative electronics in ground combat vehicles.

28 TECHNOLOGY FOCUS

Switch fabrics enter the mainstream

High-speed serial switch fabric networking for high-performance embedded parallel processing architectures is benefitting from industry standards and the OpenVPX Multiplane Architecture to take their places in demanding aerospace and defense applications like radar, signals intelligence, and electronic warfare.

38 PRODUCT INTELLIGENCE

For rugged radios, it's all about bigger networks and smaller sizes.

40 ELECTRO-OPTICS WATCH

42 PRODUCT APPLICATIONS

44 NEW PRODUCTS

48 MILAERO.COM



**SMALL;
LIGHT;
EFFICIENT**



ATS Series DC-DC Converters

Features

- 16V to 50V DC Input Range
- Internal EMI Filter
- High efficiency to 82%
- -55°C to +125°C Operating Temperature Range
- Low weight: 77 grams (typical)

With an integrated MIL-STD-461 compliant EMI input filter, IR's ATS series of 25W single and dual output DC-DC converters offer significant space and system cost-savings for high reliability and aerospace applications.

For more information call
1.800.919.7898 or visit us at
<http://hirel.irf.com>

**International
IOR Rectifier**
THE POWER MANAGEMENT LEADER

» ON THE COVER



Post-FCS vetronics Termination of the Future Combat Systems (FCS) manned ground vehicles program prompted the military and aerospace industry to partner with DOD officials to ensure billions of non-recurring engineering dollars would not be wasted, and to deliver vetronics innovations resulting from FCS into the hands of warfighters in the field. **Page 16**
Cover image courtesy Oshkosh Defense, a division of Oshkosh Corp.

Dawn of a new age in serial switch fabrics



By **JOHN KELLER**
EDITOR IN CHIEF

We stand on the doorstep of the next generation in serial data switch fabric networking, which will see vast speed increases from today's data processing. The dominant switch fabrics of today—Gigabit Ethernet, PCI Express, and Serial RapidIO—all are ready to move to even faster versions, which promise fundamental leaps in embedded computing power.

Systems engineers, meanwhile, are finding innovative uses for point-to-point communications links called Aurora and Seri-

signal processing capability, the next generations will help move data and signal processing ahead even more. Gigabit Ethernet technology is enabling high-speed control and monitoring of complex data processing. While 1-gigabit and 10-gigabit Ethernet implementations are commonplace in switch fabric networks, 40- and 100-gigabit Ethernet implementations wait in the wings not only to speed control, monitoring, and predictive maintenance forward, but also to provide more options and standardization for designers of high-speed systems.

Several years ago, the PowerPC microprocessor architecture helped revolutionize digital signal processing (DSP) applications. Prior to that, designers had to use separate dedicated DSP chips and general-purpose microprocessors. The

PowerPC enabled them to perform separate tasks with the same kind of chip to simplify programming, acquisition, maintenance, and technology insertion.

Gigabit Ethernet technology could offer similar advantages. While complex switch-fabric based computer systems use Gigabit Ethernet, PCI Express, and Serial RapidIO separately for different tasks within the system, Gigabit Ethernet as it moves into the 40- and 100-gigabit realm may enable designers to implement several different high-speed data paths with the same networking technology. Depending on the application, Ethernet used on several layers of the OpenVPX Multiplane Architecture or similar design approaches could help simplify designs and reduce life cycle costs. Where Ethernet technology is not appropriate, the next generations of PCI Express, RapidIO, and even InfiniBand are ready to become available.

Where switch fabric architectures are concerned, systems designers are looking forward to more speed, less cost and complexity, and easier upgrades and technology insertion. Couple that with new generations of tools like POET from Mercury Computer Systems, and the future of switch fabric architectures looks bright indeed. ●

Military & Aerospace Electronics

SENIOR VICE PRESIDENT, GROUP PUBLISHER

CHRISTINE SHAW
TEL (603) 891-9178 • cshaw@pennwell.com

ASSOCIATE PUBLISHER

DOUGLAS M. MAILAT
TEL (603) 891-9137 • dougm@pennwell.com

EDITOR-IN-CHIEF JOHN KELLER

TEL (603) 891-9117 • FAX (603) 891-9146
jkeller@pennwell.com

EXECUTIVE EDITOR JOHN McHALE

TEL (603) 891-9119 • FAX (603) 891-9146
jmchale@pennwell.com

SENIOR EDITOR COURTNEY E. HOWARD

TEL/FAX (509) 587-3344 • courtney@pennwell.com

CONTRIBUTING EDITOR

WESTERN BUREAU J. R. WILSON

TEL (702) 434-3903 • FAX (702) 920-8068
jrwilson@pennwell.com

PRESENTATION EDITOR CINDY CHAMBERLIN

PRODUCTION DIRECTOR SHEILA WARD

SENIOR ILLUSTRATOR CHRIS HIPP

AUDIENCE DEVELOPMENT MANAGER

JAYNE SEARS-RENFER

TEL (603) 891-9416 • jaynesr@pennwell.com

AD SERVICES MANAGER STEVE ARCHER

TEL (918) 831-9473 • admaterial@pennwell.com



EDITORIAL OFFICES

PENNWELL CORPORATION, MILITARY & AEROSPACE ELECTRONICS

98 Spit Brook Road LL-1, Nashua, NH 03062-5737
TEL (603) 891-0123 • Fax: (603) 891-0514 • www.milaero.com

SALES OFFICES

REPRINTS ANTOINETTE HIGH

TEL (717) 505-9701 • Antoinette.high@theygsgroup.com

LIST RENTAL BOB DROMGOOLE

TEL (603) 891-9128 • FAX (603) 891-9341
bobd@pennwell.com

EAST OF MISSISSIPPI PHIL DAVIS, SALES MANAGER

PennWell Publishing 106 Kenton Court, Simpsonville, SC 29681
TEL (864) 288-2290 • Cell (630) 248-5525
FAX (864) 284-9934 • phild@pennwell.com

WEST OF MISSISSIPPI JAY MENDELSON

4957 Chiles Drive, San Jose, CA 95136
TEL (408) 221-2828 • FAX (650) 941-5120
jaym@pennwell.com

MILITARY & AEROSPACE ELECTRONICS SHOW CONFERENCE & EXHIBITION GROUP

MARKETING MANAGER JENNIFER McPHAIL

TEL (918) 831-9701 • jenniferm@pennwell.com

GROUP EXHIBITS SALES MANAGER JO-ANN PELLEGRINI

TEL: 650-941-3438, ext 26 • joannp@pennwell.com

CORPORATE OFFICERS

CHAIRMAN FRANK T. LAUINGER

PRESIDENT AND CEO ROBERT F. BIOLCHINI

CHIEF FINANCIAL OFFICER MARK WILMOTH

TECHNOLOGY GROUP

SENIOR VICE PRESIDENT/PUBLISHING DIRECTOR

CHRISTINE SHAW

SENIOR VICE PRESIDENT AUDIENCE DEVELOPMENT

GLORIA S. ADAMS

SUBSCRIPTION INQUIRIES

TEL (847) 559-7500 • FAX (847) 291-4816

e-mail: mae@omeda.com, web: mae-subscribe.com



MILITARY & AEROSPACE ELECTRONICS ©2010 (ISSN-1046-9079) is published monthly by PennWell Corp., 1421 S. Sheridan, Tulsa, OK 74112. Periodicals postage paid at Tulsa, OK 74101 and additional mailing offices. Editorial offices are located at 98 Spit Brook Road, Nashua, NH 03062-5737. Subscription Prices: Free to qualified subscribers in North America. Other subscribers in U.S.A \$160.00 one year, \$280.00 two years, \$410.00 three years. Other subscribers in Canada \$250.00 one year, \$430.00 two years, \$580.00 three years. All other International \$330.00 one year, \$575.00 two years, \$750.00 three years. Call (847) 559-7500 for subscription information. We make portions of our subscriber list available to carefully screened companies that offer products and services that may be important for your work. If you do not want to receive those offers and/or information, please let us know by contacting us at List Services, Military & Aerospace Electronics, 98 Spit Brook Road, Nashua, NH 03062. POSTMASTER: Send change of address form to MILITARY & AEROSPACE ELECTRONICS, PO Box 3295, Northbrook, IL 60065-3295. All rights reserved. No material may be reprinted without permission from the publisher. Back issues of Military & Aerospace electronics may be purchased at a cost of \$15.00 each in the U.S., \$20.00 Canada, and \$25.00 elsewhere. RETURN UNDELIVERABLE CANADIAN ADDRESSES TO: P.O. Box 122, Niagara Falls, ON L2E 6S4. Printed in the USA / GST NO. 126813153 / Publications Mail Agreement No. 875376

120 Watts

½ ounce, 1.1 in²

Miniature, rugged 28 Vdc MIL-COTS converters deliver breakthrough performance and flexibility



VICHIP
FACTORIZED POWER

32.5 x 22.0 x 6.73 mm
1.28 x 0.87 x 0.265 in

- Wide input 28 Vdc (13.5 to 50 V)
- Isolated 1 to 50 Vdc output
- PRM 120 W, VTM up to 100 A
- High efficiency: >95% per chip
- Low noise, fast transient response
- Full MIL temperature: -55°C to 125°C operation
- MIL-STD-1275, MIL-STD-704, DO-160 and MIL-STD-461 compliance with M-FIAM7 filter

The MIL-COTS PRM™ regulator and VTM™ current multiplier provide the highest efficiency, highest density complete DC-DC power solution for mission critical 28 Vdc military and aerospace applications. Through hole and thermally enhanced options available.



Buy prototype quantities online

All parts in mass production and available from stock.

800-735-6200

Learn more about Vicor's MIL-COTS solutions at
vicorpower.com/rp/5_mae



NEWS

Panoramic display in F-35 Joint Strike Fighter sparks industry debate on the size of cockpit screens

By **JOHN KELLER**

FARNBOROUGH, England—The F-35 Joint Strike Fighter is setting new standards for combat aircraft avionics with its 8-by-20-inch panoramic cockpit display. This large active-matrix liquid crystal display (AMLCD) has the avionics industry talking about whether it's a good idea to place so much cockpit information on one display.

Proponents of the F-35's Panoramic Display, designed by L-3 Display Systems in Alpharetta, Ga., point out its flexibility, intuitive touch-screen use, and ability to present the F-35 Lightning II pilot with all the information he needs, quickly, and

Continued on page 8

The 8-by-20-inch panoramic display in the F-35 Joint Strike Fighter is sparking debate on how many displays are necessary in tactical aircraft.



Navy moves closer to deploying high-power laser weapon to defend against swarms of fast attack boats

By **JOHN KELLER**

PORT HUENEME, Calif.—U.S. Navy and industry laser weapons experts are moving high-power lasers a step closer to deployment aboard Navy surface warships after completing tests demonstrating the ability of a prototype shipboard laser weapon to track small boats at long ranges under maritime conditions.

These tests were part of the Navy's Maritime Laser Demonstration (MLD) system, which high-power laser experts at the Directed Energy Systems segment of the Northrop Grumman Corp. are developing under supervision of the Aerospace Division in Redondo Beach, Calif.,



A future with shipboard laser weapons, such as those depicted above, may be closer to reality after a series of laser weapons tests on the California coast.

Office of Naval Research in Arlington, Va.

IN BRIEF

ScanEagle UAV flight demonstrates narrowband communications relay

Boeing and its subsidiary Insitu Inc. demonstrated a high-performance narrowband relay communications system aboard a ScanEagle unmanned aerial vehicle (UAV). The relay was designed to meet the needs of small distributed forces operating in areas where line of sight (LOS) communications would not normally be possible. The U.S. Defense Department has widely deployed handheld narrowband radios as the primary method of communications among small, distributed forces. However, these radios are limited in range and cannot communicate where the radios do not have a direct path to one another, Boeing officials say. The Boeing-developed narrowband relay, deployed aboard a small UAV, will provide a longer range and LOS capability over hills and buildings. The U.S. Special Operations Command, the Navy Expeditionary Combat Command, and the Space and Naval Warfare Systems Command have expressed interest in the results of the Boeing-funded demonstration, Boeing officials say.

HULC exoskeleton user testing awarded to Lockheed Martin

Lockheed Martin Missiles and Fire Control in Orlando, Fla., won a \$1.1 million contract from the U.S. Army Natick Soldier Center for test and evaluation of its next-generation HULC advanced robotic exoskeleton, designed to augment soldiers' strength and endurance, as well as reduce load carriage injuries. Under this contract, the U.S. Army will test Lockheed Martin's advanced ruggedized HULC design. The upgraded HULC system includes optimized control software, extended battery life, and human factors improvements for quicker and easier sizing to each user. Lockheed Martin is also exploring exoskeleton designs to support industrial and medical applications. Dismounted soldiers often carry heavy combat loads that increase stress on the body, leading to injuries and exhaustion. Researchers at Natick Soldier Center will evaluate how the HULC affects soldiers' performance. Additionally, biomechanical testing will measure the energy expended by a soldier when using the HULC. The laboratory testing will also assess how quickly users learn to use the HULC system when carrying various loads and moving at various speeds. The contract includes options for field trials to test the system's utility in operational environments.

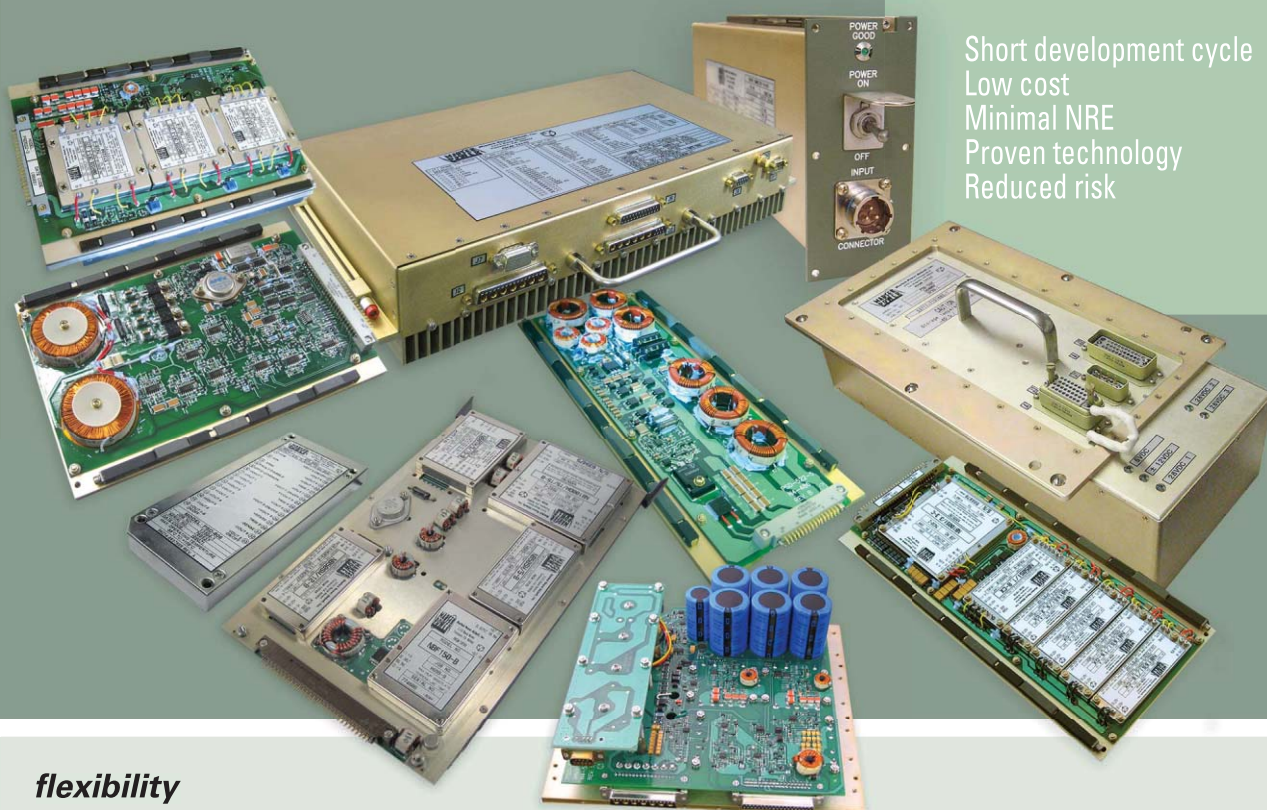
Continued on page 12

>> HIGH FLEXIBILITY
>> PROVEN TECHNOLOGY



Value Added Power Solutions from Martek Power

**FLEXIBLE SOLUTIONS
WITH FIELD PROVEN STANDARD MODULES**



Short development cycle
Low cost
Minimal NRE
Proven technology
Reduced risk

flexibility

A wide variety of inputs, including DC from 9 to 400 Vdc; AC from 85 to 265 Vac single or three phase, 47 to 440Hz.

Outputs can range from 2 to 400 Vdc, pure sine wave, 27 to 220 Vac, 500 to 1600Hz. Protection features such as current limit, overvoltage, over-temperature protection are available.

Built in test, TTL level control signals and various interface options are also available.

AS9100 / ISO 9001:2000 CERTIFIED



Power For The New Technology

tel. 310.202.8820

web: www.martekpower.com

e-mail: sales@martekpower.com

» NEWS

Panoramic from page 6

without overwhelming him with too much information. Detractors, however, contend that one big display in a military cockpit poses a single-point-of-failure risk, one that distributing several different displays throughout the cockpit, rather than relying on one big display, does not.

Despite the debate, however, large panoramic cockpit displays are receiving increasing attention from display manufacturers and avionics systems designers. L-3 officials had long considered themselves to be the only viable manufacturer of displays this large that are rugged and redundant enough for avionics use. Now, however, Elbit Systems Ltd. in Haifa, Israel, is getting into the game with its CockpitNG system. Both displays were on display in July at the Farnborough International Airshow in Farnborough, England.

The L-3 Panoramic Display for the F-35 is divided in two electronically, a design that offers full redundancy that enables the

display to continue functioning in case of component failure or battle damage. One company representative explains that L-3's Panoramic Display can withstand a puncture or a crack, and still offer all its features on only one side. In a pinch, L-3 officials point out, the F-35 pilot still can rely on his helmet-mounted display in case of catastrophic avionics failure.

Detractors, however, privately question that wisdom. Military aviation is an industry that avoids risk, and multiple-display redundancy is a deeply ingrained cultural value. Using just one big cockpit display, as the F-35 does, runs counter to much that experts have known throughout their careers. This display represents a paradigm shift in military avionics, and as such, it is treated in some quarters with suspicion and skepticism.

These cultural differences within the avionics display industry, however, have not deterred Elbit, which is offering the 22-inch-diagonal CockpitNG for consideration in military and commercial aircraft

programs and upgrades, particularly for the Boeing F-15 Eagle jet fighter. Boeing is trying to position a stealthy new version of the F-15, called Silent Eagle, as an affordable alternative to the F-35.

Getting into the large cockpit display business is not easy. The cost of entry is immense, with the amount of testing and evaluation, as well as the government certification, necessary to qualify these cockpit subsystems for use in military and commercial aircraft.

Elbit officials say they have no firm customer for the CockpitNG, while L-3's Panoramic Display still is exclusively on the F-35 Joint Strike Fighter. While skeptics claim that Elbit is simply trying to set itself up as a second-source supplier for the F-35 primary display, other cockpit designers may be giving this large display a second look. Boeing may have particular interest—particularly for foreign military sales—if Elbit's large display could make its Silent Eagle an even more attractive option to the Lockheed Martin F-35. ●

AEROFLEX
UT699 LEON 3FT
μProcessor with
AeroFlex Gaisler IP

AEROFLEX
RS485 Dual
Transceiver

AEROFLEX
Voltage
Regulator

AEROFLEX
MSI Logic
16-bit

AEROFLEX
RadTol Eclipse
FPGA

AEROFLEX
32 - 160Mbit
SRAM MCMS

AEROFLEX
Clock
Network
Manager

AEROFLEX
LVDS
DRIVER/RECEIVER
FOR SPACEWIRE

AEROFLEX
VOLTAGE REGULATION

AEROFLEX
SERIAL INTERFACE
RS485

AEROFLEX
CLOCK GENERATION

AEROFLEX
MEMORY SOLUTIONS

AEROFLEX
SYSTEM INTERCONNECT
FABRIC AND LOGIC

Like the sun, everything revolves around LEON 3FT μProcessor

AeroFlex Colorado Springs is your one-stop source for microprocessor intellectual property IP, components, and support solutions. Create your own custom LEON 3FT system today. In support of the LEON 3FT, AeroFlex offers HiRel SRAMs, SDRAMs, RadTol Eclipse FPGAs, logic, clocks, LVDS, RS-485, and voltage regulator solutions.

Call today for more information on microprocessors and system solutions.

800-645-8862
www.aeroflex.com/HiRel



NEWS

Flying the black pizza box: a new flavor of small UAV

By JOHN KELLER

FARNBOROUGH, England—Think of an extra-large black pizza box. Now put twin tails on it, a couple of magnetic-detachable electric-powered tiltrotor propellers, and a six-inch hollow nose for half a pound of cameras and other sensor payloads. Give it a remote control and digital downlink that connects to a Windows or Linux PC, and you have the Skate small unmanned aerial vehicle (UAV) from Aurora Flight Sciences in Manassas, Va.

The Skate unmanned aircraft system (UAS) was among the unmanned aircraft being shown in the special UAV pavilion in July at the UAV pavilion at the Farnborough International Airshow in Farnborough, England.

Yes, they flew UAVs indoors.

It's safe though. Think of a basketball court—no make that a half-court—enclosed on four sides by white netting to keep spectators safe. That was the demonstration area in Farnborough's UAV pavilion. Now imagine the black flying pizza box buzzing around the enclosed half court, and you have it. One person flew the Skate UAV by remote control, and another was on a microphone headset doing narration.

The Skate UAV is made from a special material like Styrofoam that is popular with model airplanes today. It offers the simplicity and endurance of a fixed-wing aircraft, yet with vertical takeoff and landing with independently articulating motor pods, which enable the Skate to switch quickly between vertical and horizontal flight.

But you should have seen that Skate buzzing around the display hall at Farnborough. The controller can make that little thing go into a steep dive, come to stop like an insect, then zip almost straight up, and all within the confines of the basketball half-court. Imagine what it could do in applications like border and perimeter security.

It's kind of an ungainly thing when it lands, but it turns out to be no big deal; Aurora engineers have designed it to thump down, popping off both of its propellers, and sometimes one of its vertical stabilizer fins pops off, too. As it turns out, the

operator just fits them back on for another flight, or takes it apart in a few seconds and stows it in a backpack.

The radio control unit is small, and links imagery and other sensor data from the Skate UAV to a ruggedized PC that is already part of the soldier's standard gear.

For more information, visit Aurora Flight Sciences online at www.aurora.aero.

Navy from page 6

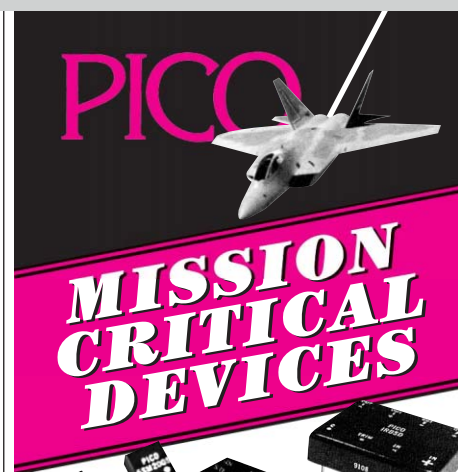
Shore-based tests of the MLD laser at the Naval Surface Warfare Center (NSWC) in Port Hueneme, Calif., proved the MLD system's ability to track small boats at long ranges and in a marine environment, Northrop Grumman officials say.

Northrop Grumman Directed Energy won a \$98 million contract for the MLD program last year to mature and demonstrate laser weapons technologies for ship-board applications. Northrop Grumman is developing laser weapon technologies suitable for use on Navy cruisers, destroyers, frigates, and amphibious assault ships to help defend against swarms of small, fast attack boats, such as those that Iran operates in the Persian Gulf.

"For MLD, lessons learned were taken from the success of the Northrop Grumman-developed Joint High Power Solid State Laser, a compact, high-brightness laser," says Dan Wildt, vice president of Northrop Grumman Directed Energy. "We also applied precision tracking experience gained from the Tactical High Energy Laser test bed at White Sands Missile Range, N.M., which has destroyed 46 rockets, artillery, and mortar rounds in flight."

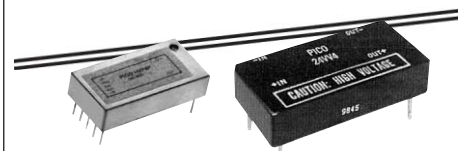
Last fall, Northrop Grumman tested the MLD system at the company's San Juan Capistrano, Calif., test site, in which experts generated a high-energy laser through the system to a target board. They used atmospheric and system models to demonstrate the ability to transport, rapidly set up, and operate the system.

For more information, visit Northrop Grumman Directed Energy Systems online at www.as.northropgrumman.com.



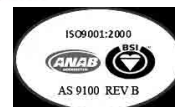
DC-DC Converters

AC-DC Power Supplies



- Expanded Operating Temperatures **-55 to +85C**
- Vibration, *Method 204, Cond. D*
- Shock, *Method 213, Cond. I*
- Altitude, *Method 105, Cond. D*
- Environmental Screening
- Specification Review
- Custom Models Available
- 400 Hz and Now - **800 Hz AC-DC Models**

Thousands of Standard Models 2V to 10,000 VDC Outputs - 0.75 to 2,000 Watts



PICO Electronics, Inc.

143 Sparks Ave, Pelham, NY 10803-1837

E-Mail: info@picoelectronics.com

www.picoelectronics.com

See full Catalog immediately www.picoelectronics.com

» NEWS

VITA launches VXS Marketing Alliance to promote adoption of VITA 41 switch fabric architecture

By **JOHN KELLER**

SCOTTSDALE, Ariz.—VITA, the open-systems embedded computing trade association in Scottsdale, Ariz., is launching the VXS Marketing Alliance to promote the adoption and development of ANSI/VITA 41 VME switched serial fabric products and applications. More than 80 VXS products are available and deployed throughout the world, VITA officials say.

VXS is used in traditional open-standards embedded computing applications in the military, industrial, and medical industries. Industry analysts say VXS sales should triple from 2009 to 2012. VXS is an ANSI/VITA standard that combines parallel VMEbus with enhancements to support switched serial fabrics, including PCI Express, RapidIO, StarFabric, and InfiniBand over a high-speed P-zero connector. This technology maintains backward compatibility with existing backplanes that

do not have a conflicting P-zero scheme.

“VXS has become the primary system architecture for upgrades that seek to maintain their tried-and-true investments in VME hardware and software while adding high-speed serial connections for sensors and multiprocessors,” says Ray Alderman, executive director of VITA.

The VXS Marketing Alliance focuses on advancing VXS technology, market intelligence, and educational material, and promotes use of the specification to develop a strong installed base in military, industrial, medical, and other mission- and life-critical embedded applications.

“Our goal is to spread awareness of the value VXS brings embedded systems applications and to promote the related product and service offerings of our member



companies” says Justin Moll of Elma Bustronic, chairman of the VXS Marketing Alliance.

The current VXS Marketing Alliance roster has 12 company members: Concurrent Technologies Plc; CSP Inc.; Cur-

tiss-Wright Controls Inc.; Elma Electronic Inc.; EVOC Intelligent Technology; Hartmann Electronic; Mercury Computer Systems Inc.; Meritec/Joy Signal Technology; Pentek Inc.; SIE Computing Solutions; TEK Microsystems Inc.; and W-IE-NE-R, Plein & Baus GmbH.

The VXS Marketing Alliance joins the VPX and FMC marketing alliances backed by VITA. These marketing alliances seek to promote and grow the adoption of standards-based products.

For more information, visit the VXS Marketing Alliance online at www.vita.com/vxs, or VITA at www.vita.com. ●

Rugged wearable computer with GPS and tactical radio interface rolled out by GD Itronix

By **JOHN KELLER**

SUNRISE, Fla.—Rugged computer specialist General Dynamics Itronix in Sunrise, Fla., is introducing the GD300 wearable computer that combines satellite navigation, data communications, and battlefield-rugged computing to enhance situational awareness for the foot soldier.

The GD300 has a sensitive, commercial global positioning system (GPS), ARM Cortex A8 microprocessor, Android operating system, 3.5-inch color sunlight-readable display, and radio interface kit in an 8-ounce package that infantrymen can wear on their wrists or chests, or carry in the pockets of their battlefield gear.

The radio interface kit enables users to connect

the computer with tactical radios like the AN/PRC-154 Rifleman Radio, which is a software-defined radio system that complies with the U.S. military’s Joint Tactical Radio System (JTRS) architecture.



General Dynamics Itronix is merging radio technology with wearable computers in its GD300 for infantry soldiers.

Once the GD300 is connected to a tactical radio, the user can exchange text, imagery, and other data with others on the battlefield, as well as gain access to the Tactical Internet to access streaming video from unmanned aerial vehicles and other intelligence, surveillance, and reconnaissance (ISR) assets.

The radio interface kit docks onto the bottom of the GD300 wearable computer. “As radio networks change, the computer does not have to be replaced,” explains Jason

Jacob, product manager of the GD300 at General Dynamics Itronix. “You can just modify the radio interface kit itself.”

The Android operating system enables the GD300 to add and delete commercial and military software programs, including the Tactical Ground Reporting System (TIGR) Web-based information management application from General Dynamics C4 Systems in Fairfax, Va.

In addition to the sunlight-readable display, the GD300 has a night-vision appliqué so that users can read the screen at night while wearing night-vision goggles, Jacob describes.

“The screen is a regular transmissive display that uses a resistive touch screen designed with gloved fingers in mind,” Jacob says. “This is fully rugged and lightweight, and there are not a lot of devices out there that are only half a pound and still fully rugged.”

For additional information, visit General Dynamics Itronix online at www.gd-itronix.com. ●



WE MAKE HARDWARE THAT SAVES LIVES.



PRODUCTS

High Power RF Amplifiers
High Power RF Subsystems
High Power RF Systems

SPECIFICATIONS

DC - 40+ GHz
Power levels to 10,000+ watts
MIC and Hybrid Construction
AS9100 Certification

PLATFORMS

Abrahms Main Battle Tank
Stryker Combat Vehicle
Humvee
Bradley Fighting Vehicle
Black Hawk Helicopter
Joint Strike Fighter
AV8B Harrier
F15 Eagle
F16 Fighting Falcon
F18 Super Hornet
F35 Joint Strike Fighter

SYSTEMS & ENVIRONMENTS

Electronic Warfare
RADAR
Communication Systems
Pulsed or CW
Airborne
Land, Sea and Space



RF
Amplifiers

RF
Subsystems

RF
Systems

www.aethercomm.com



PICO

Transformers and Inductors

...think **PICO** small!



Over 5000 Std.
Ultra Miniature

think...
low profile
from
.19" ht.

**Surface Mount
(and Plug-In) Models**

**Audio / 400Hz / Pulse
Multiplex Data Bus /
DC-DC Converter
Transformers / Power
& EMI Inductors**

See Pico's full Catalog immediately
www.picoelectronics.com



*PICO units manufactured
and tested to MIL-PRF-27
requirements. QPL units
are available. Delivery
stock to one week for
sample quantities.*

PICO Electronics Inc.

143 Sparks Ave, Pelham, NY 10803-1837
Call Toll Free: **800-431-1064**
E Mail: info@picoelectronics.com
FAX: **914-738-8225**



**MILITARY • COTS • INDUSTRIAL
TRANSFORMERS & INDUCTORS**

» NEWS

» IN BRIEF

Raytheon to provide mission support for RAID system

Raytheon won a \$23 million U.S. Army contract extension to provide mission support and system sustainment for the Rapid Aerostat Initial Deployment (RAID) systems that protect U.S. and coalition forces deployed to Afghanistan and Iraq. RAID consists of infrared sensor systems elevated on a stationary platform. This capability enables U.S. and coalition forces to respond rapidly to threatening situations. Raytheon first developed RAID to meet the military's need for persistent surveillance in Operations Enduring Freedom and Iraqi Freedom. Work will be performed at the Raytheon IDS Integrated Air Defense Center in Andover, Mass., and at the Warfighter Protection Center in Huntsville, Ala.

Navigation avionics for Atlas V rocket to be provided by Honeywell

United Launch Alliance selected Honeywell Aerospace in Phoenix to provide primary avionics components for guidance and navigation of the Atlas V rocket in a follow-on contract worth as much as \$90 million over the life of the long-term contract. Honeywell will provide the Fault Tolerant Inertial Navigation Unit (FTINU) and the Redundant Rate Gyro Unit (RRGU). Honeywell will deliver 25 FTINUs and 38 RRGUs beginning later this year and continuing through 2016. Honeywell's FTINU and RRGU work together to perform inertial measurement functions and to provide computer processing capability for the inertial and flight software. The most recent Atlas V launch included the U.S. military's X-37B Orbital Test Vehicle. For more information about launches, visit www.ulalaunch.com.

Heads Generation II helmet sensor unveiled by BAE Systems

Engineers at BAE Systems released their next-generation Headborne Energy Analysis and Diagnostic System (HEADS) helmet sensor. The debut follows a recent \$17 million award from the U.S. Army for BAE Systems' HEADS Gen-

eration II sensor, which is designed to better monitor soldiers and assist in the identification and diagnosis of combat-related traumatic brain injuries (TBI). "Diagnosing mild to moderate combat-related TBIs can be challenging. For example, following an explosion from a roadside bomb, soldiers will sometimes continue with their mission, unaware that the concussion from the blast may have lingering effects," says Joe Colman, vice president of BAE Systems' Personnel Protection Systems business. The sensor itself is small, lightweight, and can be secured inside virtually any combat helmet. It is designed to continuously collect critical, potentially lifesaving data, including impact direction, magnitude, duration, blast pressures, angular, and linear accelerations, as well as the exact times of single or multiple blast events. That information is then securely stored until it can be quickly downloaded and analyzed by medical teams using a simple USB or wireless connection.

Boeing and Aeronautics team on DA42 Dominator UAV

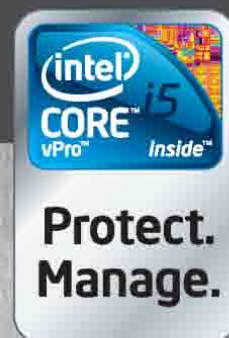
Boeing signed a memorandum of understanding with Aeronautics Ltd. in Yavne, Israel to market the DA42 Dominator unmanned aerial vehicle (UAV). The DA42 Dominator is designed for intelligence, surveillance, and reconnaissance missions with an all-composite construction that provides durability, reduced maintenance, and lower aircraft weight to enhance mission endurance.

F-22 Full Mission Trainers to be built by L-3

L-3 Link Simulation & Training in Arlington, Texas, won \$39.2 million in production contracts from Boeing to build 12 F-22 Full Mission Trainers (FMTs). Boeing developed and implemented the overall F-22 Training System, which includes L-3's high-fidelity F-22 FMTs that enable pilots to practice operating the aircraft. F-22 FMTs are used to reinforce air-to-air and air-to-ground warfighting skills, including undertaking simulated missions against advanced integrated radar networks and dense surface-to-air missile environments. The FMTs are integrated into the U.S. Air Force's Distributed Mission Operations training network, enabling F-22 pilots to train and conduct missions with other aircrews flying different simulated aircraft at locations throughout the world.

Panasonic
ideas for life

Windows®. Life without Walls™. Panasonic recommends Windows.



IN MY WORLD, WE WALK A THOUSAND MILES IN OUR CUSTOMERS' SHOES.

EXPERIENCE THAT DELIVERS 7 TIMES MORE RELIABILITY THAN THE INDUSTRY AVERAGE.

As a core manufacturer that has worked closely with customers in government and business for 17 years, Panasonic has a unique understanding of your needs. Many of our employees come from the military, law enforcement, fire, EMS and other government positions, and they have first hand experience with the challenges you face. Our goal is to provide you with the most reliable computing solution to enable you to meet those challenges head-on without worrying about downtime. Because we build our products from the ground up, we are able to maintain exceptional quality control. The result is a rugged, reliable product line powered by the Intel® Core™ i5 vPro™ Processor,* which has one of the lowest annualized in-warranty failure rates in the industry.¹ So what's next? We'll keep walking in your shoes so we can continue to deliver the performance and reliability you have come to count on.

Learn more: 1.888.322.3895 / panasonic.com/toughbook/federal



Toughbook U1 Toughbook C1* Toughbook H1 Field Toughbook 31** Toughbook 52***

**TOUGHBOOK
FOR A TOUGHWORLD™**

TOUGHBOOK

*Compared to the in-warranty industry average as noted in available published reports. Results may vary depending on environment product is used in.

Intel, the Intel logo, Intel Core and Core Inside are trademarks of Intel Corporation in the U.S. and other countries. Toughbook notebook PCs are covered by a 3-year limited warranty, parts and labor. To view the full text of the warranty, log on to panasonic.com/business/toughbook/support.asp. Please consult your Panasonic representative prior to purchase. Panasonic is constantly enhancing product specifications and accessories. Specifications subject to change without notice. (*CF-C1A, **CF-31A, ***CF-52M, CF52P are Intel® Core™ i5 vPro™ Processor models) ©2010 Panasonic Corporation of North America. All rights reserved. CustomerShoes_FG_FY10-4

» NEWS

Marines choose Insitu Integrator for Small Tactical Unmanned Air System (STUAS)/Tier II

By **JOHN KELLER**

LAKEHURST, N.J.—The U.S. Marine Corps is choosing the Integrator unmanned aerial vehicle (UAV) from Insitu Inc. in Bingen, Wash., to meet the service's Small Tactical Unmanned Air System (STUAS)/Tier II requirements.

The U.S. Naval Air Warfare Center Aircraft Division in Lakehurst, N.J., awarded a \$43.7 million contract to Insitu in late July to begin full-scale development of the Integrator UAV for the Marine Corps.

Integrator provides battlefield commanders with round-the-clock, real-time intelligence, surveillance, and reconnaissance (ISR) through an electro-optical and infrared sensor package from Hood Technology Corp. in Hood River, Ore. Sensors transmit high-resolution imagery via an encrypted line-of-sight digital data link from L-3 Communication Systems-West

in Salt Lake City. Harris Corp. in Melbourne, Fla., is providing the communications relay payload to support secure ground communications.

Insitu will begin the 24-month engineering, manufacturing, and development phase to build and test its Integrator to ensure it meets STUAS/Tier II system requirements. Insitu partners are The Boeing Co.

in Seattle, Harris Corp., Corsair Engineering Inc. in Kirkland, Wash., and Black Ram Engineering Services LLC in Kirkland, Wash.

Integrator will support two operational tests, the first to determine if the Marines should field five systems next year, and the second to build two systems—one for the Navy and one for the Marines. Initial operating capability is expected in two years, after

which Insitu will build 56 Integrator UAVs.

Integrator is part of Insitu's Insight family of UAVs, which includes the ScanEagle UAV. Compared to ScanEagle, the Inte-



The U.S. Marine Corps is upgrading its small unmanned aerial vehicle capability with the Integrator UAV from Insitu.

grator can fly longer missions with larger payloads.

Integrator decouples the payload from the airframe to ease payload integration. Additional internal payload options for Integrator include a wide range of intelligence, communications, and expandable capabilities and options.

The Integrator is strong enough to carry external payloads, including all existing ScanEagle payloads, as well as electro-optical and infrared sensor turrets and communications. The UAV's baseline configuration includes stabilized sensor payload with visual and long-wave infrared (LWIR) sensor and mid-range infrared (MWIR) cameras with optional infrared marker and laser rangefinder. Integrator avionics are based on Athena Guidestar system that uses differential GPS navigation.

The Integrator's data link can communicate as far as 55 nautical miles with extended beyond-line-of-sight mission radius of as far as 550 nautical miles.

The Integrator has an empty weight of 55 pounds. Loaded with 25 pounds of fuel and sensor payload, the maximum takeoff weight is 130 pounds. Powering the Integrator UAV is an eight-horsepower reciprocating piston engine that runs on heavy fuel or automobile gasoline. The UAV can cruise at 55 knots, has a maximum speed of 90 knots, and can fly as high as 20,000 feet.

Marines will launch and recover the Insitu with a pneumatic catapult launcher and wingtip snag, enabling safe and reliable recovery without the need for infrastructure, over rough or mountainous land, as well as at sea. Users can control the integrator with the Insitu Insight common ground system components.

Insitu is a wholly-owned independent subsidiary of The Boeing Co. For additional information, visit Insitu online at www.insitu.com.



Omnetics Quality now available in Micro-D

- .050" (.64mm) on center
- Available in 9-51 position
- Wire-to-wire, SMT, Solder Cup and Thru-Hole
- Built to the specifications of MIL-83513
- Rugged, Light Weight and Reliable

To view different configurations or to find your local representative visit us at:
www.omnetics.com

HARM anti-radar missile moves ahead with planned upgrade to dual-mode seeker

By **JOHN KELLER**

PATUXENT RIVER NAS—The U.S. Navy is moving ahead with a project to improve the capability of U.S. air-to-ground missiles designed to suppress enemy air defenses to pinpoint and destroy enemy radar systems even if those radars have been switched off or deploy missile countermeasures.

Officials of the Naval Air Systems Command at Patuxent River Naval Air Station, Md., awarded at \$50.1 million contract in August to Alliant Techsystems (ATK) Defense Electronics Systems Division in Woodland Hills, Calif., for the second batch of low-rate production of the AGM-88E Advanced Anti-Radiation Guided Missile (AARGM).

The AARGM program is developing a dual-mode guidance section for the U.S. AGM-88 High-Speed Anti-Radiation Missile (HARM), the primary U.S. weapon to

seek and destroy enemy radar-guided anti-aircraft missiles and launcher sites. HARM homes in on enemy radar signals and follows those signals to their sources.

One persistent problem with HARM and its predecessors, such as the AGM-45 Shrike missile, is dealing with enemy radar systems that switch off to protect themselves from anti-radar missiles like HARM and Shrike. The AARGM is designed with a dual-mode seeker that blends anti-radar homing and active millimeter wave radar to locate and destroy enemy air defenses even after radars shut down or employ countermeasures.

Under terms of the contract, ATK will convert 37 government-furnished HARM missiles into AGM-88E AARGM all-up round/captive air training missile systems—33 for the U.S. Navy, and four for the government of Italy.

The AARGM guidance section has a



The U.S. High-Speed Anti-Radiation Missile (HARM) will receive a dual-mode seeker to make the air defense-suppression missile effective even when enemy radar is turned off.

passive anti-radiation homing receiver and antennas, a global positioning system, inertial navigation system, and active millimeter wave radar for terminal guidance. Furthermore, the seeker will be able to transmit data to orbiting satellites just before hitting its target to inform command authorities whether its target has been destroyed.

For more information, visit ATK Defense Electronics Systems online at www.atk.com.

SynQor brings high efficiency synchronous rectifier technology to the Military & Aerospace industries.

Hi-Rel

DC/DC Power Converters & Filters

- ▶ High efficiency: >90% at full load
- ▶ Full power from -55 to +125°C
- ▶ Fixed switching frequency
- ▶ No minimum load requirement
- ▶ Parallel operation with current share
- ▶ Primary & secondary referenced enable
- ▶ 28V and 270V nominal input voltages

Designed and manufactured in the United States of America



www.SynQor.com/MA



SynQor
Advancing the Power Curve®

» SPECIAL REPORT

THE vetronics landscape in a post-FCS WORLD

By **COURTNEY E. HOWARD**

Industry leaders and military officials forge ahead in the battle to install ever more innovative electronics in ground combat vehicles.



U.S. Marine Corps personnel operate a mine-resistant, ambush-protected vehicle in Garmsir, Afghanistan. (Image courtesy U.S. Marine Corps, Lance Cpl. Cody A. Fodale.)

Termination last year of the Future Combat Systems (FCS) manned ground vehicles program by the U.S. Department of Defense (DOD) was met with tremendous concern, followed closely by considerable resolve. A determined military and aerospace industry partnered with DOD officials to ensure billions of non-recurring engineering (NRE) dollars would not be wasted, and that vehicle electronics, or vetronics, innovations resulting from FCS would be delivered in the hands of awaiting warfighters in the field.

"We have learned from the Future Combat System (FCS) program—over 40 technologies—and we have incorporated that inside of a Ground Combat Vehicle (GCV) construct," explains Lt. Gen. Bill Phillips, military deputy to the assistant secretary of the Army for acquisition, logistics and technology (ASA ALT). "FCS—plus what we know today from eight years of war—has resulted in the release of an RFP [request for proposal] for GCV. We could not have done this

without industry; this is a partnership between our Army and industry to make sure we do the right things to make sure we put this capability in the hands of the warfighter."

Introducing GCV

"The new GCV represents an essential capability for [the U.S. Army's] modernization strategy," says Gen. Peter W. Chiarelli, vice chief of staff of the Army. "In fact, it represents one of the most important combat development and acquisition decisions we will make over the next seven years."

The GCV is to be a first-of-its-kind vehicle: a versatile, nine-man squad infantry carrier that protects against improvised explosive devices (IEDs) and other threats, moves in urban and off-road terrain, and accommodates emerging technologies, such as new electronics, as they become available. The Army's goal is to build competitive prototypes by 2015 and production vehicles by 2017.

Chiarelli describes the GCV as "one of the most versatile vehicles that the Army has

The most trusted provider of computer architecture for operational, deployable and high-reliability applications.



Crystal Group products:

- TESTED to MIL-STDs 810G, 167-1, 461F, & MIL-S-901D
- Operate in Extreme Temp Ranges (-20C to +71C)
- Offer Three + Year Warranties
- Designed & Manufactured in the USA for over 23 years



Rugged Embedded Solutions



****NEW****
RS363S15FM
Rugged 3U Mil-Circ Server



Rugged Integrated Vetronix Solutions



Rugged Product Line



www.crystalrugged.com

Crystal Group Inc.

Veteran-owned Small Business

1.800.378.1636

ISO 9001:2008 certified

All trademarks are property of their respective owners. Photos courtesy of the Department of Defense

» SPECIAL REPORT

ever designed.” The vehicle is being developed in an incremental fashion such that it can quickly incorporate technological change and enhance the Army’s ability to keep pace with changes anticipated on the battlefields of today and tomorrow.

“The GCV will address capability gaps we have identified from eight years of

war—such as mobility for our soldiers both inside and outside cities, improved information sharing for both mounted and dismounted soldiers while on-the-move,” describes Lt. Gen. Michael Vane, director of Army Capabilities Integration Center in Fort Monroe, Va. “The GCV will be required to carry an entire infantry squad

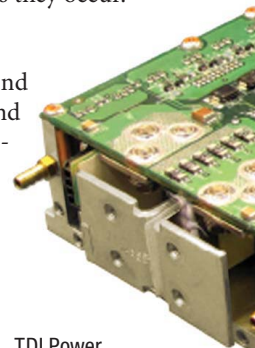
in one vehicle and protect it with sufficient space and electric power to accept network and other improvements as they occur.”

Following FCS

The drive to add more and more electronics to a ground combat vehicle continues. “The intent is to reduce the manpower necessary within the vehicle, such as moving from a three-man crew to a two-man crew, and to capitalize on electronics commonality,” explains Doug Patterson, vice president of worldwide marketing and sales at embedded computing specialist Aitech Defense Systems Inc. in Chatsworth, Calif. “In other words, instead of each individual subsystem being a little Picasso unto itself, the idea is to have some commonality across the processing platform so that you can use systems and subsystems again and again and over and over, without having to reinvent the wheel for each application.

“Inside these vehicles, there are probably thousands of processors and systems that are all running independently,” Patterson continues. “Within FCS, the application was to put a large centralized mission computer with dual-redundant buses inside the vehicle communicating to remote interface units (RIUs) that talk to individual sub-platforms within the vehicle, such as the turret, transmission, main gun, engine, stabilized machine gun sitting on the roof, and so on.”

Each RIU would take on a different application or different function based on where—what location or track within the vehicle—it was plugged in. “So you could have eight or nine different RIUs all taking on various functions within the vehicle, but it is the exact same unit,” Patterson adds. “If you could produce one RIU and it gets used in nine different places, but it picks up its application from where it is located in the vehicle, it makes maintaining the vehicle just that much easier. If you’re out in the field and one of the track units dies, but you don’t need a turret, you just



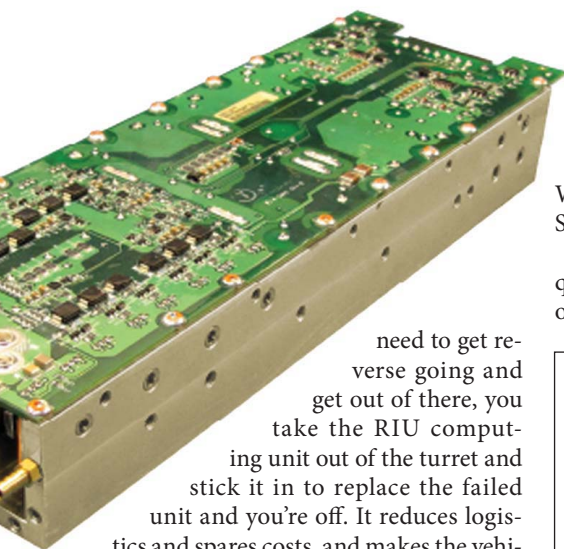
TDI Power supplies the military with battery chargers, DC/AC inverters, UPS products, and overall power management systems at power levels from 1kW to 25kW, including the 370Vdc to 28Vdc LiquaCore 4kW Power Module above.

POWER ON THE MOVE

VEHICLE AC & DC POWER SYSTEMS FROM TDI POWER

908.850.5088 ▶ tdipower.com ▶ info@tdipower.com

SPECIAL REPORT



need to get reverse going and get out of there, you take the RIU computing unit out of the turret and stick it in to replace the failed unit and you're off. It reduces logistics and spares costs, and makes the vehicles more maintainable in the field—which is the right thing to do.”

This approach also reduces the number of hangar queens—combat vehicles that are stripped of their parts (or “cannibalized”) in an effort to keep vehicles in the field functioning. “You’ve basically got a hulk inside some rear echelon area that’s just gathering dust as you start pulling more and more electronics out of it to keep the other existing units running,” Patterson explains. “It’s expensive and it’s a waste of money.”

Aitech engineers, working with General Dynamics Land Systems (GDLS) in Sterling Heights, Mich., developed a modular RIU and associated remote interface control cards (RICCs) for the FCS program’s manned ground vehicle (MGV). Aitech has since expanded its RIU offerings with the NightHawk rugged controller/data concentrator unit, which is employed in such mil-aero platforms as the M1128 Stryker mobile gun system. “Although a lot of work was done to create the RIU for FCS vehicles, it still has life in GCV and other applications,” Patterson says. “The concepts of FCS will go forward in the GCV and make it a better system overall.”

Acquisition reform

In addition to the end of the FCS MGV and the birth of the GCV, 2009 ushered in the Weapon Systems Acquisition Reform Act, which modified the way Pentagon contracts and purchases major weapons systems. In an effort to cut military spending and reduce waste, the act pushes for demonstrations earlier in the program development phase, and for the desired technologies to have higher technology readiness levels (TRLs) than previously

required or desired, describes Chris Wiltsey, vice president of Intel SBC and Embedded Computing IPT at Curtiss-Wright Controls Embedded Systems in San Diego, Calif.

“The transformation of the Army’s acquisition strategy means that instead of developing many new programs, the

emphasis will be on upgrades, modifications, and evolutionary development—and the selection will be done through technology demonstrations of mature solutions,” Wiltsey adds. “The new approach seeks more mature technologies sooner to build and support the technology demonstration phase.”

WANT MORE FROM YOUR DVE?



A highly, advanced DVE for enhanced situational awareness.



DROP-IN REPLACEMENT
Works with existing cables, mounts and sensors.

THE DVE10-VR2 DISPLAY

- (2) RGB Inputs
- (1) AUX RS-170 Input
- (1) Standard DVE Sensor Input and Control with Digital Interface
- Touch Interface (Optional)
- Programmable Buttons for External Device Control
- Enhanced Sunlight Readability and Night Dimming Control
- Integrated NVIS (Optional) - MIL-STD 3009



DIGITAL SYSTEMS ENGINEERING, INC. (DSE)
WWW.DIGITALSYS.COM

A U.S. OWNED SMALL BUSINESS

» SPECIAL REPORT

"This trend is helping to make prepackaged and prequalified subsystems of greater interest to platform manufacturers, who now find themselves with less time and available DOD funding to develop a desired technology internally," Wiltsey says. "Vetronics customers are showing increased interest in pre-configured subsystems from COTS (commercial off-the-shelf) vendors."

In response, COTS vendors such as Curtiss-Wright Controls are evolving and enhancing their pre-configured subsystem product families. Vendors are "going beyond the traditional 'universal machine' approach of offering generic, interoperable, modular building blocks for the customer to adapt to its application, to instead provide fully capable Solution Sets," Wiltsey notes. "The knowledge and experience obtained



Curtiss-Wright's MPMC-9620, a 6U VME system with two Intel processing modules, is employed in embedded training functions within ground combat vehicles.

building universal Packaged COTS systems is enabling COTS vendors to optimize the packaging to offer specific solution

sets for applications, such as mission computing, vehicle control, network-ready computing, or sensor processing, that meet the new need for fast turnaround and high Technology Readiness Levels (TRLs)."

Although Wiltsey and his colleagues see an increased demand for prepackaged and prequalified subsystems based on

COTS products going forward, unique product features still may be required to fulfill all the needs of vetronic systems. Curtiss-Wright Controls helps address such needs with its Modified COTS (MCOTS) design process and business model, which provide the ability to design and manufacture modules with COTS features in unique form factors, or to add unique features in COTS modules.

Mil-aero customers increasingly seek turnkey systems, built from a single vendor from the ground up, rather than a do-it-yourself solution encompassing parts from various manufacturers that weren't specifically designed to work together cohesively.

"Customers want more highly integrated solutions, more out-of-the-box solutions, not bits and pieces they have to twiddle together, and spending weeks, months, and years getting them to talk to each other," Patterson observes. "They want a subsystem that works out of the box such that they simply layer on their application and it works. You've got all these different pieces designed to solve everything, until you plug them all together and they don't work and have to spend tens of hundreds of engineering hours integrating these bits and pieces together. The customer base is just saying 'enough, give me stuff that works.' The customer base has been screaming for it for years, and it's where the NightHawk came from. It's a rugged PC in a box; all you do is layer on the application (Windows or Linux) and it is running."

Existing platforms

In the post-FCS military environment, attentions have turned to modernizing existing combat vehicle platforms in the field. "With technology upgrades

Demanding JANS Diodes Demand A Flexible Source!

Aeroflex Metelics now offers JANS qualified parts for your most demanding space and military applications.

JANS Product Portfolio:

Our MIL-PRF-195900 JANS qualifications include hard glass switching diodes, (/578 and /609) and zeners (/435). Both families are available in standard axial and MELF packages.

Certifications:

- JANS certified diode line
- JAN, JANTX, JANTXV certified transistor line
- ISO9001:2008 certified

888-641-7364

www.aeroflex.com/JANma

SPECIAL REPORT

to extensive military vehicles, vetronics systems have to deal with stricter requirements in regards to size, weight, and power (SWaP) constraints, along with increased functionality demands.”

SWaP—specifically smaller size, less weight, and less power—is what everyone asking for, Patterson says. “The average [vetronics] customer has very specific spots where stuff can fit and it’s usually some odd nook and cranny. Just as an example: the latest electronics upgrade to the Cobra helicopter actually fit the computer into the pilot’s seat. What wraps around his head as part of his neck support is actually a computer system because they ran out of places to put stuff. That kind of thing is happening with Stryker [armored combat vehicle], which does not have an environmental control system. It doesn’t have air conditioning, making it tough to work in the middle of the desert. It wasn’t a basic original requirement, so that had to be put in as part of the Stryker modification

program.”

Curtiss-Wright, to meet SWaP challenges, is incorporating some of the latest technologies available, such as the company’s Intel single-board computer product line. “By integrating the latest

technology,” says Wiltsey, “we are able to provide twice the performance or half the size, every two or three years, delivering greater performance and reduced SWaP.”

Innovative system packaging is another solution to increased SWaP requirements.

COMPANY INFORMATION

Aitech Defense Systems Inc.

Chatsworth, Calif.
888-248-3248
www.rugged.com

Crystal Group

Hiawatha, Iowa
877-279-7863
www.crystalrugged.com

Curtiss-Wright Controls Embedded Systems

San Diego, Calif.
858-452-0020
www.cwembedded.com

Digital Systems Engineering

Scottsdale, Ariz.
480-515-1110
www.digitalsys.com

Force Protection

Ladson, S.C.
888-235-0497
www.forceprotection.net

GE Intelligent Platforms

Charlottesville, Va.
www.ge-ip.com

General Dynamics

Land Systems
Sterling Heights, Mich.
586-825-4000
www.gdls.com

Kontron America

Poway, Calif.
888-294-4558
www.kontron.com

Oshkosh Defense

Oshkosh, Wis.
920-235-9150
www.oshkoshdefense.com

TDI Power

Hackettstown, N.J.
908-850-5088
www.tdipower.com

Themis

Fremont, Calif.
510-252-0870
www.themis.com

Bricks-On-A-Plate™

Quick, Rugged, Flexible Power Solutions

Field proven component power

- Save valuable engineering time
- Risk mitigation
- Reduce cost
- Improve time to market

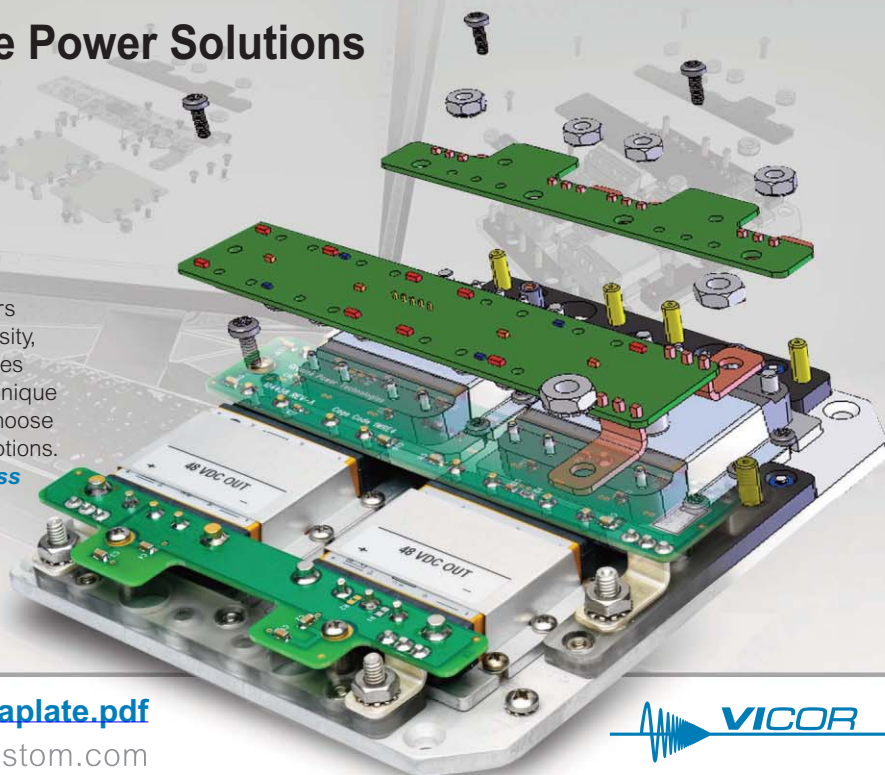
Vicor's "Bricks-On-A-Plate" power solution offers unique configuration flexibility, high power density, high reliability, and quick time to market at prices not usually found in custom solutions. Vicor's unique mass-customization capability allows you to choose from thousands of power modules and filter options.

You'll get the small company responsiveness with large company resources.



www.vicorpower.com/bricksonaplate.pdf

800-496-5570 or apps@vicorcustom.com



Smarter Faster More Reliable

Introducing Crane's 2 to 20 GHz frequency synthesizer used in radar warning receivers, emitter locators, electronic warfare, simulator and instrumentation applications.

- Broadband, low cost, single loop synthesizer design
- 1 MHz step size
- < 50 usec tuning time
- Internal or external reference
- -40°C to +85°C operating temperature range
- VME compatible (6U/2 Slots)
- Custom interface available

As leaders in the industry, Crane's Microwave Systems Solutions provide RF and microwave products for the defense, space and communications industries for use in electronic countermeasures, missiles, radar, intelligence and guidance systems.



© Copyright 2010 Crane Aerospace & Electronics. All Rights Reserved.

» SPECIAL REPORT

"Ensuring the proper electronic packaging implementation to address thermal, weight, fit, and structural issues is a key aspect of integrating a subsystem," and a focus of Curtiss-Wright's mechanical engineering group, Wiltsey says.

Digital Systems Engineering (DSE) engineers in Scottsdale, Ariz., have introduced more compact rugged displays based on feedback from the digital fighter. The DVE08,



A U.S. Army gunner prepares a common remotely-operated weapon station (CROWS) to engage a target during a qualifying test fire near Forward Operating Base Sharana, Afghanistan last month. The CROWS system replaces human gunners on top of vehicles with cameras and detection systems mounted on the turret, minimizing the risk to gunners and allowing weapons operation by using the system's camera, video screen, and joystick. (Image courtesy U.S. Air Force, Master Sgt. Demetrius Lester.)

an 8.4-inch, 3.6-pound Driver's Vision Enhancer (DVE) display, is designed for easy integration in various wheeled vehicle platforms, ranging from Medium Mine Protected Vehicles (MMPVs) to smaller, lighter MRAP All-Terrain Vehicles (M-ATVs).

SWaP seachanges

"There is little doubt that SWaP is becoming an overriding concern in combat vehicles. The requirement to add increasing amounts of functionality with higher performance in spaces that are becoming more constrained is a recurring one," explains Gene Parker, business development manager of vetronics at GE Intelligent Platforms in Charlottesville, Va.

"One of the implications is that we are seeing a transition from 6U VME to 3U VPX, because of the higher performance of VPX and because of the smaller form factor of 3U," Parker adds. Processors from Intel and Freescale are also helping reduce power consumption and heat dissipation. In fact, the company's PPC9B single-board computer uses Freescale's P2020 dual core processor to deliver nearly 10x the performance of Freescale's 7410 without consuming more power (20 to 25 watts).

Another growing requirement is for boards, especially 3U VPX boards, built with covers to the VPX ruggedized enhanced design implementation (REDI) specification, Parker

SPECIAL REPORT

explains. "They are being recommended by the U.S. Army TACOM (Tank-Automotive and Armaments Command) so that boards will support a line replaceable module (LRM) concept, allowing them to meet desired two-level maintenance requirements; it allows a faulty board to be replaced in situ in the field, substantially reducing repair costs and the lengthy time and supply chain required to replace entire systems."

Condition-based maintenance

Maintaining vehicles and vetronics in the field can be expensive, time-consuming, and dangerous. For these and other reasons, the industry has seen an uptick in the adoption of condition-based maintenance (CBM). "The maintenance manuals that go with each vehicle—which can constitute reams of paper, five or six volumes on how to maintain the vehicle—say that every 200 hours or so you need to replace the engine, replace the transmission, or do other site maintenance on a bearing, for example. It gets very expensive very quickly," Patterson says.

With CBM, "you monitor key points or key focus areas, such as the main bearings of the turret or the engine or transmission, and you heavily sensor the engine and the engine compartment to understand what the temperatures are, how many operating hours are on it, the oil viscosity, the average temperature of the oil, etc.," Patterson explains. "It actually looks at the condition of the vehicle and then predicts maintenance based on that information. It's based on heuristics and actual real-life data, so you might get 1,000 hours out of an engine with CBM instead of servicing it four times during the same time period and costing thousands and thousands of dollars. You monitor the condition of major elements and service them as needed, not when a book says to do so; that is providing a whole new area of logistics and cost savings to the ground vehicle market."

Aitech engineers and executives are working with the primes and providing a solution set or near solution set with COTS or modified COTS, working to integrate it into the vehicle, and working with the end user to make sure it meets the requirements. The company's NightHawk RCU, with algorithms developed by academia, is currently being installed on a test vehicle for mil-aero CBM applications. Aitech's NightHawk RCU is also used for vehicle embedded training.

In-situ simulation

Warfighters in armored vehicles need to train on associated armaments. "It is awfully expensive to keep shooting shells over the mess tent whenever you want to practice, hoping one doesn't fall short," Patterson admits. Embedded training enables soldiers to simulate battle inside the vehicle on the actual hardware without moving and without firing a thing. In some embedded training scenarios, Aitech's NightHawk RCU embedded PC is performing video switching and graphics overlays to help train military personnel. "It works with the existing [vetronics] consoles such that you can play war games inside the vehicle," he says.

Embedded training is a hot topic, Parker agrees. "In among all the other systems onboard a typical military vehicle, there is

a growing requirement for embedded training systems," he explains. "They have two key benefits: First, by definition, they're capable of much more realism than is possible in the classroom, which makes the training more valuable; second, it makes productive use of what would otherwise be troop downtime. Embedded training leverages the systems that are, for the most part, already on board and allows them to be used as if the vehicle was on a real mission."

Curtiss-Wright's MPMC-9620, a 6U VME system with two Intel processing modules, graphics, and audio capabilities, is employed by several ground vehicles to perform embedded training functions within the vehicle. In this application, the MPMC-9620 allows the soldiers to run operator training simulations in the crew station using the actual vehicle controls and displays, Wiltsey describes.

Integral imaging

High-quality imagery and information is integral to the realism or fidelity of military simulation and training, yet it is also critical to warfighter intelligence, surveillance, and reconnaissance (ISR). Sensors gather mission-critical information to enhance ISR, warfighter safety, and mission effectiveness, as well as contribute to a network-centric battlefield.

"The future is all about how more data is captured from sensors,

Transducers by AAC:

**High-reliability performance.
High-reliability delivery.**

For 45 years, AAC has provided fast response to requests for compact, mission-critical current, voltage, power, and frequency transducers.

Let us deliver the same timely, highly reliable performance in designing and manufacturing standard or **custom transducers** for you, for a variety of applications:

- Space, Aircraft, Land Vehicles, Shipboard
- Rail Transit
- Industrial Controls
- Military and Commercial Grade



AAC

American Aerospace Controls

570 Smith Street Farmingdale, NY 11735
Tel: (631) 694-5100 Toll Free: (888) 873-8559
Fax: (631) 694-6739 / (631) 845-0766
Email: aac@rcn.com www.a-a-c.com



» SPECIAL REPORT

and how that data is moved at high speed to where it's most needed," Parker notes. "We're talking about radar, of course, but what is becoming really hot is vision systems—acquiring video data from cameras, processing it, and turning it into useful information. The challenges are in processing the image in the first place—decluttering it, tracking multiple targets, working around obscuration and decoys—and then compressing the resulting video stream such that it can be transmitted at high speed with minimal bandwidth consumption and minimal loss of quality."

Parker, like other mil-aero industry executives, is witnessing an increase in the number of vetronics developers who are evaluating GPGPU, or general-purpose computing on a graphics processing unit (GPU). "GPGPU leverages the massively parallel nature of a GPU's processor architecture, but uses it for non-graphics applications," he says. He notes growing interest in GE Intelligent Platforms' Nvidia CUDA-



U.S. Air Force senior airmen check radio equipment inside a mine-resistant, ambush-protected vehicle last month at Camp Liberty, Iraq. (Image courtesy U.S. Air Force, Senior Airman Perry Aston.)

A new Era in Miniaturization

3D-plus

SOLID STATE DRIVES 4GB TO 32GB

www.3d-plus.com

enabled boards, such as the IPN250, a multi-slot solution capable of delivering 390 gigaflops of performance from a single slot. "One customer achieved a 15x increase in a radar application by using Nvidia GPGPUs."

Jim Shaw, vice president of engineering at Crystal Group in Hiawatha, Iowa, is seeing demand for image processing with considerable throughput. "The use of state-of-the-art GPGPU technology, namely the Nvidia GeForce platform using the CUDA compiler, is becoming more common for vetronics," he says. "These applications are required to crunch large amounts of signal processing data on the move. The use of these cards in a military environment presents a challenge for VPX, due to the form factor, and standard rugged servers, because they are rarely rugged."

"The need for mobile supercomputing in severe environments is providing a great deal of opportunity for companies that have the capabilities to integrate these technologies," adds Shaw, who is also privy to a growing desire to solve the power problem within military combat vehicles.



SPECIAL REPORT

for vetronics. Sealed because of the sand and dust issues; liquid-cooled because with supercomputers comes super power demands. It presents the packaging engineer with a new level of cooling challenges; and, in addition to being power hungry, this supercomputer needs to survive MIL-STD-810 ground mobile vibration.” At Crystal Group, engineers are answering these needs with a combination of selectively liquid-cooled components and air-to-liquid/liquid-to-air heat exchangers to isolate the electronics from the environment. In fact, Crystal Group’s solution for a recent military vetronics application consumes 1.6 kilowatts (kW) of power in an 11 cubic-foot, sealed enclosure.

Power, heat, and packaging

“Undoubtedly, we are seeing the requirements for vehicular power—for both onboard and export applications—increase well beyond what anyone could foresee just a few years ago,” acknowledges Mike

Henderson, director of Military & Aerospace Products at TDI Power in Hackettstown, N.J. “For example, the Humvee onboard power requirement has increased more than eight times the original vehicle specification, and new vehicles like the JLTV [Joint Light Tactical Vehicle] are driving the power curve even higher.” For example, 20 kilowatts of onboard DC power to run new systems—such as the WIN-T communication system, for example—as well as 10kW or more of AC power for off-vehicle applications will become commonplace, he says.

The influx of new vetronics systems has caused dramatic increases in onboard power requirements, Henderson explains. In addition, larger amounts of AC power exportable off the vehicle are desired to power remote command posts, communication systems, field hospitals, and so on. At the same time, there is a push to eliminate towed generators that are heavy, noisy, and present a very attractive thermal signature

A powerful problem

A great deal is going on, specifically in military ground vehicles, to add capability and capacity via modern electronics. If you look at the High Mobility Multipurpose Wheeled Vehicle (HMMWV or Humvee) and all the electronics systems that are being added to that vehicle—each for very specific reasons such as to thwart IEDs or rocket-propelled grenades (RPGs)—the vehicle’s electrical system can’t handle it, Patterson admits. “They are having to put upgrades in for new alternators, new wiring systems, and new batteries to deal with the added capacity.

“We heard from the program offices that the vehicle commander in situ, in the situation and in the environment, has to decide which systems to turn on and which to turn off,” Patterson mentions. “Do I turn off the mine detection system or the RPG detection system? How would you like to be faced with that decision? It’s a horrible decision to make, and one the commanders don’t want to have to make. Yet, you learn by doing, you learn from the application, and that’s what defense is all about.”

Shaw also is privy to a growing desire to solve the power problem. “Oddly enough, customers are coming to us and asking for completely sealed, liquid-cooled enclosures

Ultra low-dropout and ultra performance



Aeroflex Plainview’s 7.5 Amp Ultra Low-Dropout Voltage Regulators offer user-adjustable output voltage as low as 1.0V. The high-current-at-low-voltage operation makes these LDOs ideal for space applications, supporting today’s leading microprocessor, memory, FPGA, and ASIC technologies.

- Max dropout <0.5V @ 7.5A
- Adjustable:
 - 1.0–3.3V output
 - Power-up slow start
 - Output current limit
- -55°C to +125°C temp range
- 100 krad(Si) total dose

www.aeroflex.com/voltregMAE
800-645-8862

AEROFLEX
A passion for performance.

» SPECIAL REPORT

for the enemy, he says. "As such, the optimum solution is for the enhanced electrical capability to be satisfied by the vehicle itself. The need for more power, lower weight, better reliability, and cost containment require very innovative solutions. Not surprisingly, these factors typically work in conflict with each other."

New command, control, and communications (C3) systems are becoming increasingly capable. "That is good news for our warfighter, who will be able to fight future battles much more efficiently and effectively; but, traditional 28-volt DC vehicle power systems just can't provide sufficient power, so intermediary DC buses of 370 or 700



POWERED BY IMAGINATION.

Early on, our engineers knew that we are only limited by imagination when it comes to the wonder of flight. That's why VPT has spent years developing hi-rel DC-DC converters and accessories that fulfill the flight dreams of companies such as Boeing, BAE, GE, Honeywell, Honda, the US Air Force and many others. Around the world, aviation depends on VPT.



- ▶ Power outputs of 5-200W in single, dual, or triple output DC-DC converters
- ▶ Small size, light weight, full metal packaging
- ▶ Wide avionics temperature ranges with full performance from -55° C to +100° C
- ▶ Tested to JESD22, MIL-STD-810, and MIL-STD-883
- ▶ Also ask about our DV Series fully hermetic, MIL-PRF-38534 H&K class products

VPT
a HERCO company
Power Your Critical Mission Today.

FIND OUT MORE AT:
www.vpt-inc.com/ImagineAvionics



volts DC are needed." In turn, these higher-power systems require innovative thermal management and packaging. At TDI Power, engineers have developed a new technology and complementary family of products: LiquaCore (trademarked and patent pending).

"The technology employs liquid cooling from the vehicle's coolant system to dissipate heat away from sensitive electronics in a modular, scalable architecture," Henderson explains. The system is designed to provide very high levels of AC or DC power in a completely sealed product that can be mounted below the fording plane of the vehicle, freeing up valuable space inside the vehicle cabin for the soldier.

The solution cools electronics with a water/glycol mix, described essentially as antifreeze, at a typical temperature of 80 degrees Celsius (176 degrees Fahrenheit). It employs something that is already present on the vehicle and does not require fans or heavy dissipating heat plates, Henderson says. "With LiquaCore, we can quickly configure a power solution using standard modules in a customized outer skin that meets the end users' available space claim," he adds. "For example, the power conversion system can easily be mounted in the V-shaped undercarriage of vehicles such as MRAPs."

Empowering MTRVs
The U.S. Marine Corps all-terrain Medium

SPECIAL REPORT



The Joint Tactical Radio System (JTRS) Ground Mobile Radio (GMR) is a software-programmable radio system providing networked communications on-the-move, including secure, reliable, multi-channel voice, data, imagery, and video communications for mobile military users. (Image courtesy Boeing.)

Tactical Vehicle Replacements (MTVRs) are not immune to the growing challenge of delivering adequate power. U.S. Marine Corps Systems Command (MARCOSSYSCOM) personnel, in March 2012, will test on-board vehicle power (OBVP) kits from Oshkosh Defense, a division of Oshkosh Corp. in Oshkosh, Wis. The OBVP kits leverage Oshkosh ProPulse diesel-electric drive technology, which is reportedly capable of powering a small airport or entire city block from a single military vehicle. Specifically, the MTVR with OBVP will provide 120 kilowatts of exportable military-grade power while stationary, and 21 kilowatts of military-grade power while on the move.

"There is a rapidly growing demand in the military for on-board power to support mobile radar systems, command centers, IED-defeat systems, and many other applications," says John Bryant, vice president and general manager of Marine Corps Programs for Oshkosh Defense. As a result, company staff partnered with the Navy and Marine Corps to produce a technology platform to provide troops with

increased tactical flexibility, while reducing the logistics footprint.





The OBVP kits will be supplied and integrated on MTVR standard and extended cargo trucks in January 2012, and government evaluation and testing is expected to begin in March 2012. Oshkosh personnel also will provide the training and

sustainment support required for the new technology during government testing, under a contract valued at more than \$8 million.

The foreseeable future is bright for vetronics suppliers, integrators, and end users and limited only by our imaginations—and perhaps also SWaP constraints. ●

Essential Building Blocks... Innovative Solutions.



-  Signal Processing HW
-  IP & FrameWorks
-  Development Tools
-  Systems & Services

Size Weight and Power...

Today's military electronic systems require flexible state-of-the-art processing performance in a low power, compact solution that meets the demands of the extreme conditions of the battlefield. That's where BittWare's high performance signal processing FPGA solutions come in. Conduction-cooled, ruggedized, and COTS compliant VPX, VME/VXS and CompactPCI boards based on Altera's Stratix family of FPGAs provide fast time to market, on-the-fly flexibility and the ability to process complex, compute-intensive algorithms in real time. BittWare military solutions for radar, sonar, SigInt and electronic warfare provide developers the **Essential Building Blocks** necessary to deliver **Innovative Solutions** today for tomorrow's state-of-the-art military systems.



Based on the Altera Stratix family of FPGAs for signal processing

For more information, visit bittware.com

TECHNOLOGY FOCUS

Switch fabrics enter the mainstream

High-speed serial switch fabric networking for high-performance embedded parallel processing architectures is benefitting from industry standards and the OpenVPX Multiplane Architecture to take their places in demanding aerospace and defense applications like radar, signals intelligence, and electronic warfare.

By **JOHN KELLER**

Computationally intensive aerospace and defense applications—most notably radar processing, signals intelligence, and electronic warfare—all have a simple and basic need to move massive amounts of data as quickly through their computing systems as possible, with few, if any, delays from software code overhead, communications authentication, conflicts with data packets, or other data roadblocks and bottlenecks.

Traditional backplane databus approaches to this task in high-end and complex applications essentially have reached the extent of their capabilities, which is leading systems integrators to find new ways of moving mountains of data quickly and reliably. These approaches often involve the latest generations of high-speed serial data switch fabrics organized in a division of labor that not only makes the most of their separate advantages, but that also considers upfront costs and prospects for long-term industry support.

The idea is to find the most efficient ways to move data through the system along conduits best suited for the different varieties of data running through these systems, while using widely supported commercial standards to assure systems integrators working on these high-end applications that they will have reasonably priced support for years to come, and can take advantage of commercially available technology as it evolves for upgrades and technology insertion.



This signals intelligence system from TEK Micro Systems uses the Aurora and Gigabit Ethernet networking interfaces. All FPGA-to-FPGA links use Aurora, and the resulting data is delivered to the host computer via Gigabit Ethernet.

Lessons of parallel processing

Computer scientists for years have understood one of the best ways of processing a big chunk of data is to break the job down into several smaller jobs, and process them simultaneously on several different central processing units. The steadily increasing capability of today's microprocessors has made the job of parallel processing relatively easy, compared to years past. The difficulty these days is to get the data to the processors quickly enough for efficient computational operations.

Think of a factory that increases the speed and capacity of each station along the assembly line, but neglects its conveyor belts. Each station on the line might be able to increase its throughput separately,

but overall the factory cannot move any faster because the old, creaky conveyor belts can't feed materials to each station quickly enough to keep it at capacity.

It is much the same with high-end parallel processing computer systems. Today's microprocessors crunch data at screaming-fast rates, but the overall computer system continues to plod along if data cannot reach the microprocessors fast enough. Computer architects often refer to this phenomenon as "keeping the processors fed."

Traditional backplane databus structures, in essence, cannot keep the processors fed. Parallel databus structures move data in parallel ranks much like soldiers marching in formation. The problem, however, is their limited speed. Instead, today's parallel processing computer architectures use high-speed serial data switch fabrics

Themis' New Rugged Servers Have Speed to Burn and Keep Their Cool.

New! 1RU RES Servers

- One or two Intel® Quad-Core 5500 Series Xeon® CPUs with Intel Nehalem Microarchitecture
- Up to 96GB ECC SDRAM
- Up to 3 removable and lockable 2.5" HDDs
- One PCI-E 2.0 x16 slot, optional SAS expansion



RES-12XR3 server shown with optional filter door panels.

New! 2RU RES Servers

- One or two Intel Quad-Core 5500 Series Xeon CPUs with Intel Nehalem Microarchitecture
- Up to 144GB ECC SDRAM
- Up to 8 removable and lockable 2.5" HDDs
- Up to 7 expansion slots (PCI-E and PCI-X)



A New Era of Performance and Rugged Reliability

Themis' new family of XR3 Series of Rugged Enterprise Servers™ (RES) includes the latest Quad-Core Xeon processors and Nahelam Microarchitecture from Intel.

These new Intel chips revolutionize server performance, and Themis' robust designs – only 20" depth - provide the reliability to keep mission critical applications running.

Themis servers provide far greater reliability, improved life cycle management and substantially lower TCO than other COTS systems solutions.

Features in the RES-XR3 servers include:

- Dual redundant, hot-swappable power supplies
- Dual redundant DC power option
- Operating shock - 3 axis, 25G, 20ms
- Operating vibration - 3.0 Grms, 8Hz - 2000Hz
- Light weight, corrosion resistant, 20" depth chassis
- Optional air filter door panels

So when the environment gets tough and your data is critical, turn to the company that builds systems to perform in the harshest conditions. For Sun® Solaris™, Linux®, and Microsoft® Windows® environments. For more information on Themis' rugged new servers, please visit us at www.themis.com.

Themis rugged, mission-critical computers. Designed to take it.

www.themis.com (510) 252-0870

New! 3RU RES Servers

- One or two Intel Quad-Core 5500 Series Xeon CPUs with Intel Nehalem Microarchitecture
- Up to 144GB ECC SDRAM
- Up to 8 removable and lockable 2.5" HDDs
- Up to 7 expansion slots (PCI-E and PCI-X)



RES-32XR3 server shown with optional filter door panels open.

THEMIS

Transformational.

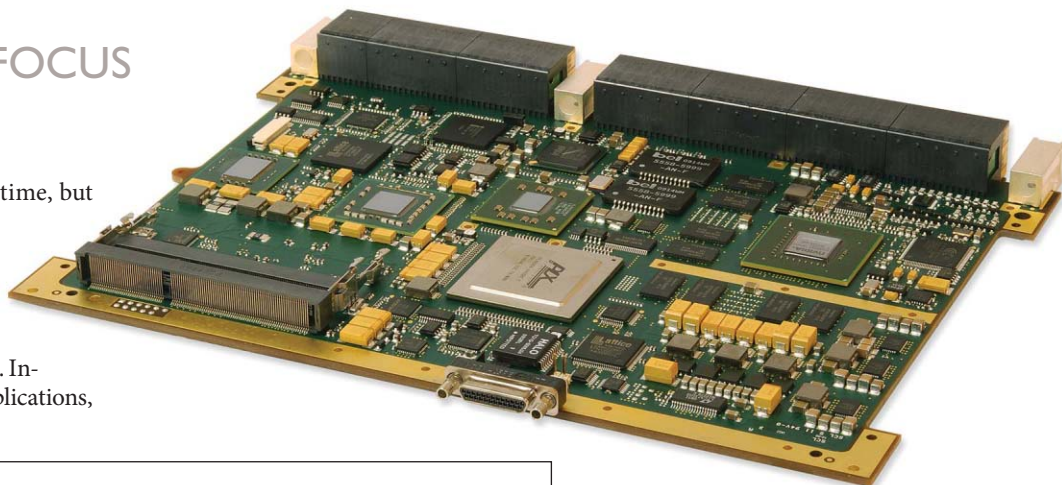
©2009. Themis Computer, Themis, the Themis logo, and Rugged Enterprise Servers are trademarks or registered trademarks of Themis Computer. All other trademarks are the property of their respective owners.

» TECHNOLOGY FOCUS

that move data bits just one at a time, but at blinding speeds.

Today's switch fabrics

Today's most dominant serial switch fabrics are Serial RapidIO, PCI Express, and Gigabit Ethernet. InfiniBand is moving into niche applications,



Making Sense of

OpenVPX™



Elma's solid foundation of core capabilities is based on decades of hardware design expertise, extensive thermal management techniques, and in-depth knowledge of all the building blocks required for an application ready platform. We leverage that experience along with the long term relationships built with best in class partners to deliver truly interoperable COTS based platforms.

Call us to find out how to navigate through the new OpenVPX standard to design the right high performance platform you need.

Call us or visit our website for more details

www.elma.com

510.656.3400

www.elmasystems.com

215.956.1200



Embedded Computing Solutions by Elma

ELMA

Your Solution Partner

Box Level Solutions

ATRs & Chassis Platforms

Pre-Integrated Subsystems

SystemPaks

Open VPX™



OpenVPX Development Platform

The IPN250 6U OpenVPX board from GE Intelligent Platforms combines a 2.26 GHz Intel Core 2 Duo processor with a 96-core Nvidia GT240 graphics processor for advanced processing with switch fabrics.

but still has a loyal following, while others that were players in the past, such as StarFabric, seem to be falling by the wayside.

"If a vendor had gotten started with something like InfiniBand or StarFabric, and the programs are ongoing, they will continue to supply those switch fabrics," says Rodger Hosking, vice president of signal processing specialist Pentek Inc. in Upper Saddle River, N.J. "But with new systems coming up, vendors will look around to see who is offering which products, and will see far more offerings for PCI Express and Serial RapidIO."

The primary advantages of these switch fabrics involve their commercial viability, widespread industry understanding, and clear upgrade paths for the future. Not only are these fabrics open-systems commercial standards that move data quickly, but they also come included with some of today's most popular microprocessors used in parallel-processing embedded applications. PCI Express, for example, is included with the most advanced processors from Intel Corp. in Santa Clara, Calif., while PCI Express and Serial RapidIO come with PowerPC-based microprocessors from Freescale Semiconductor in Austin, Texas. "If you are Intel-oriented, PCI Express is built in, and is free of charge; it comes along for the ride," points out David Pepper, product manager and technologist for single-board computers at GE Intelligent Platforms Charlottesville, Va.

"PCI Express is used on commercial applications; all PCs have PCI Express, and the market has developed a commercial infrastructure," says Ben Klam, vice president of engineering at embedded computer



» How can I reduce my time-to-deployment? «

Kontron provides a unique blend of COTS and specialized systems, custom-tailored to meet the most demanding requirements of our customers.

- » Kontron's expertise goes beyond compliance, providing systems that fully address the complex needs of customers with application specific hardware and software elements.
- » With a long track-record of engineering excellence, Kontron is able to mitigate risk and reduce time-to-deployment.
- » Experienced program management allows Kontron engineers to work seamlessly within complex programs and multi-partner development scenarios.

CRITICAL QUESTIONS ... ANSWERED

FS-5985

1/2 ATR Conduction Cooled Rugged Chassis - cPCI, VPX



- » Suitable for MIL-STD-5400 Class I environments
- » 5 Conduction Cooled 3U slots to IEEE 1101.2, 0.8" pitch

Cobalt™

Reduced SWAP - High Performance Embedded Computer



- » Small Form Factor (6.5" x 9.725" 2.95")
- » Intel® Core™2 Duo or Atom™ processor options
- » Custom I/O option

VX3020

High Performance 3U VPX Rugged PC



- » Implements VITA 46.0, 46.4, 46.7, 46.9
- » 1.5 GHz Dual Core® Core™2 Duo processor

CONTACT US

Call, Email or Visit today.

Call: 1-888-294-4558

Email: info@us.kontron.com

Visit: kontron.com/military



If it's embedded, it's Kontron.

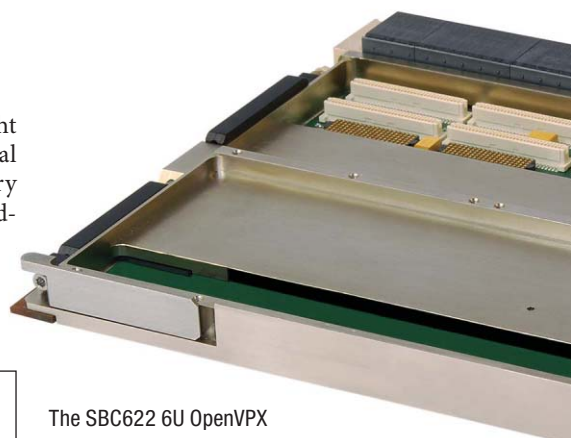
» TECHNOLOGY FOCUS

specialist Extreme Engineering Solutions Inc. (X-ES) in Middleton, Wis. "Now you are seeing that with Gigabit Ethernet."

PCI Express, moreover, is fast. The first generation of the switch fabric moves data at 2.5 gigabits per second, while the second generation moves data at 5 gigabits per second. "These gigabit serial links are

arranged as bonded lanes, four or eight lanes bonded together, that form a logical channel," says Pentek's Hosking. "Every time you add a lane, you add more bandwidth to that logical channel."

Gigabit Ethernet, which also is included on today's popular microprocessors, is among the most ubiquitous



The SBC622 6U OpenVPX CPU board from GE Intelligent Platforms implements the Intel Core i7 processor, and can be used with switch fabric networking.

and widely understood switch fabrics, with a broadly installed base of 1-gigabit and 10-gigabit versions, and also with a future that includes 40- and 100-gigabit versions.

"Gigabit Ethernet is agnostic about what you are talking to," explains Andy Reddig, president and chief technology officer at embedded signal processing expert TEK Microsystems Inc. in Chelmsford, Mass. "You can talk to an X86 or PowerPC [microprocessors], and you could be talking inside the box or to a computer on the other side of the world; it is agnostic to that."

Field-programmable gate arrays (FPGAs) from Xilinx Inc. in San Jose, Calif. now have 1-gigabit Ethernet built in, and in the future will come with 10-gigabit Ethernet as part of the package. "I'm looking forward in two or three years when Xilinx FPGAs will have a 10-gigabit Ethernet interface inside them," Reddig says. "When they do that, I won't have to use a lot of FPGA gates to implement it, and then 10-gigabit Ethernet will really take off."

Serial RapidIO is a fast switch network with commercial support from Freescale Semiconductor, and has been a household name in high-end embedded computing since switch networks entered the conversation. Not only has it been around relatively for a long time, but it also has a reputation for being among the best switch network choices for low network overhead and low latency.

"Ethernet is great for sharing with many people, whereas Serial RapidIO or PCI Express is much better for point-to-point communications, explains Aaron Frank, product marketing manager for switches, routing, and network products at Curtiss-Wright Controls Embedded Computing in Ottawa.

When it comes to InfiniBand, some

www.mskennedy.com

Three Phase BLDC Motor Drivers

Potent Power!
Compact, High Reliability

MSK 4354
600 Volts, 10 Amps
Boot Strap
High Side Supply

MSK 4310
Complete
Closed Loop
Speed Controller
55 Volts, 10 Amps

MSK 4301
75 Volts, 29 Amps
100% Duty Cycle
Capable

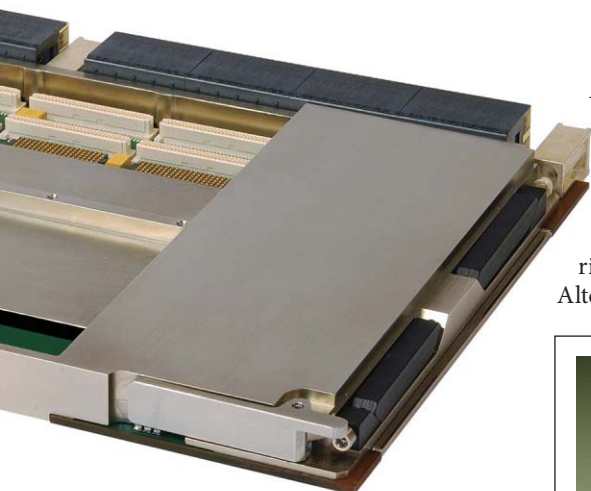
MSK 4351
600 Volts, 50 Amps
Fully Isolated
Smart Power
3-Phase Motor Driver

Certified to
Class K & Class H
MIL-PRF 38534

M.S. Kennedy Corporation **MSK**

4707 Dey Road, Liverpool, New York 13088
315-701-6751 • www.mskennedy.com

TECHNOLOGY FOCUS



experts in the embedded computer industry say this switch fabric is all but dead. "It has zero traction," says TEK Micro's Reddig. "InfiniBand has virtually disappeared from embedded today. It did a lot of good things, but in power-, size-, and weight-constrained applications it is not very efficient."

Others are not so sure, however, and say InfiniBand's obituary may have been written prematurely. "If you had asked me a year ago, I would have said there is nothing going on with InfiniBand outside of the large data centers," says GE's Pepper. "But what's happening in the deployed world, the radar guys are saying InfiniBand is a good, reliable fabric that is scalable and with low latency."

Pepper, who is based in Huntsville, Ala., says InfiniBand, like RapidIO, has a long-standing reputation for low overhead and predictably fast latency in applications where the fast passing of data is absolutely critical. "Certain folks get concerned about the potential latency and overhead associated with Gigabit Ethernet, and those who are sensitive to that want to use InfiniBand."

InfiniBand also may be used as a technology bridge in the industry's transition to 40-gigabit Ethernet. A 40-gigabit-per-second version of InfiniBand may become widely available before 40-gigabit Ethernet does, says Marc Couture, director of applications engineering for advanced computer solutions at Mercury Computer Systems Inc. in Chelmsford, Mass.

There are other data interconnects that are coming into play in today's embedded computing architectures, although some would argue that these are simply high-speed and specialized point-to-point interconnects, and not really switch fabrics at all.

Among these are interconnects specifically designed to exchange data among field-programmable gate arrays. The first, called Aurora, is only for communication between FPGAs made by Xilinx. The other is called SerialLite, and is for linking FPGAs from Altera Corp. in San Jose, Calif.

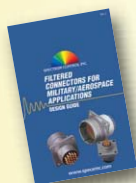
"Aurora is good for us because it is the most lightweight interface to get from card to card if there are FPGAs on both ends," says TEK Micro's Reddig. "It gets 99.9 percent of theoretical maximum across the wire. If you have four cards with FPGAs, then Aurora is a really good choice, but it is not a fabric; it is a



Specialty Circular Connectors

Our vertical integration gives you custom MIL & Hi-Rel connectors *FAST!*

- Custom EMI filtered and unfiltered connectors
- We make our own planar and tubular capacitors, shells, shields, seals and grommets
- Vertical integration means higher quality and the industry's shortest lead times (8-10 weeks, std)
- Filtered connector styles include MIL-DTL-38999, MIL-DTL-83723, MIL-DTL-26482, MIL-DTL-55116 and MIL-DTL-24308
- Our EMI expertise gives you a better filtered connector
- 100% testing for critical electrical parameters
- Harnessing products to IPC-A-610 and J-STD-001



Download our Circular Connector Design Guide



See how quickly we can solve your connector challenge...

Call **888.267.1195** or visit **SpecEMC.com/circular**

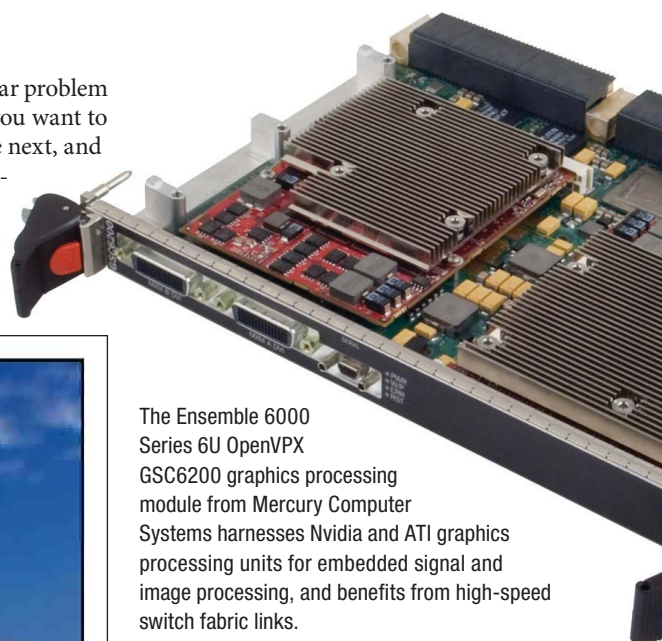
» TECHNOLOGY FOCUS

point-to-point serial interface.”

As for Altera’s version of this kind of interconnect, “the latest version is Serial-Lite II, which is a very lightweight, fast interconnect for Altera FPGA communications,” says Mark Littlefield, director of the Curtiss-Wright Controls Embedded Computing office in Chatsworth, Calif. “There

are certain parts of the large radar problem and signals intelligence where you want to flow data from one FPGA to the next, and then to the next, as a signal-processing chain,” he says. It is low overhead, low latency, and it is reliable.”

Still, in an open-systems



The Ensemble 6000 Series 6U OpenVPX GSC6200 graphics processing module from Mercury Computer Systems harnesses Nvidia and ATI graphics processing units for embedded signal and image processing, and benefits from high-speed switch fabric links.

world, serial interconnects that are vendor-specific can make some systems integrators nervous. There may be an open-systems solution in the future, however. “We are starting to see from our customers somewhat of a move away from that,” Littlefield says. “Gazing into my cloudy crystal ball, the market will want to go to a standards-based protocol before too much longer, and that will probably be 40-gigabit Ethernet XAUI,” which is short for Attachment Unit Interface.

“XAUI can be used with 10-gigabit or 40-gigabit Ethernet,” Littlefield says. “It is very lightweight, even when compared to RapidIO, so it is good for point-to-point, with the same order of overhead with Aurora and SerialLite.”

Several years ago, debate raged in the embedded computing community over which switch fabric was the best for different applications. Those who were there refer to these days as the “fabric wars.” Today’s approaches—particularly in embedded computing applications—are less about pitting one switch fabric against another, and more about industry consensus in a standard approach that seeks to move data simultaneously on several different information conduits optimized for each use.

OpenVPX Multiplane Architecture

Enter the OpenVPX Multiplane Architecture. This is an industry-standard parallel processing model for high-end applications like radar processing, signals intelligence, and electronic warfare that relies on high-speed serial data switch fabrics like Serial

A FEW DEGREES CAN BE THE DIFFERENCE BETWEEN SUCCESS & FAILURE

When there is no room for compromise, you need protection that eliminates the infiltration of dirt, dust, sand, water and heat - all of which can lead to failure of your critical electronic equipment. Our maintenance-free thermoelectric air conditioners are available in 200-2500 BTU sizes and AC/DC power configurations. EIC will also *integrate* these rugged reliable coolers into a large selection of NEMA style *enclosures* or shock-mounted *transit cases* to fit your precise needs. The result is an unmatched protection combination. You will extend the life of your essential electronics and be able to depend on your equipment in any environment.

**Call Us
For Our New
Product Guide**

1-800-497-4524
www.eicsolutions.com

Enclosures & Cooling Systems
for the World's Harshest Environments

TECHNOLOGY FOCUS

RapidIO, PCI Express, and Gigabit Ethernet organized logically to move data throughout embedded computing systems quickly and efficiently.

The OpenVPX architecture, despite its name, applies not only to VPX embedded computing architectures, but also to VXS, AdvancedTCA (ATCA), as well as other parallel computing approaches that rely on switch fabrics, explains Mercury's Couture. "The defense world revolves around VPX, while the PICMG telecommunications world revolves around AdvancedTCA," Couture says. Ruggedized applications, he says, most likely will be VPX systems because no plans are in the works to ruggedize AdvancedTCA sufficiently for most aerospace and defense applications.

The OpenVPX Multiplane Architecture essentially divides data communications tasks within a parallel processing system into different virtual planes, or layers, and organizes them according to the kind of data that each layer handles. The different virtual layers of the OpenVPX architecture consist of management plane, control plane, data plane, expansion plane, and user plane.

At the lowest level is the management plane, which is always on and functionally is decoupled from the other planes. The management plane monitors system health, performs diagnostics for maintenance and troubleshooting, and also can do prognostics for predictive maintenance.

Speed, overhead, and latency are not nearly so important for the management plane as is the ability to communicate with the widest variety of chips, boards, boxes, sensors, and other systems as possible. Ethernet, in one or more of its versions is a preferred switch fabric for the management plane. Next is the control plane, which can act like a traffic cop in the network by keeping conflicts to a minimum and handling interrupts so they cause minimal disruption. Ethernet also is a preferred fabric for the control plane.

The third plane in the OpenVPX architecture is the data plane, which calls for a high-speed switch fabric to transfer data

among processors or other components on a board, or among separate boards in a system, or even among separate boxes in a complex system. For this plane, system integrators can use either a distributed architecture or a switch through which modules on the network route their communications. For the data plane, the preferred

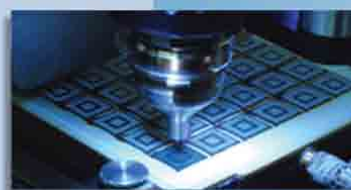
switch fabrics tend to be PCI Express, Serial RapidIO, sometimes InfiniBand, and some designers also are considering Ethernet running at 10 gigabits per second or faster.

The next layer is the expansion plane, which is intended for high-throughput data communications typically among

CERTIFIED REBALLING SERVICES



ISI has more than 8 years experience in ball attach, removal and replacement. The ISI process was developed to minimize the stress that BGAs are subjected to at each process step. This refined process enables us to certify every shipment to the following:



We **certify** that your parts are protected through the process to IPC/JEDEC J-STD MSL Classification as required by the semiconductor supplier.

We **certify** that the process we use for ball removal will protect the silicon and it will never be subjected to a time temperature cycle above 50% of the supplier's recommended cycle.

We **certify** that the ball attach process will be performed in a nitrogen environment in a conducting convection oven and will never exceed 90% of the time temperature recommended by the supplier.

We **certify** we will 100% optically inspect the reballing parts to ensure the device meets the original supplier's specifications for flatness and coplanarity.

The ISI reballing process has been qualified by leading Commercial, Industrial, Military and Aerospace companies.

ISI Interconnect Systems Inc.

www.isipkg.com
(805) 482-2870

» TECHNOLOGY FOCUS

two specific entities in the system. In practice, this often means the expansion layer is not a network at all, but is simply a point-to-point communications link that handles raw data moving at tremendous speeds. The expansion plane is eight lanes of PCI Express, says Mercury's Couture, and is especially useful in enabling general-purpose graphics processing units (GPGPUs) to communicate at fast speeds with central processing units.

Next comes the user plane, in which systems integrators can add their proprietary information management approaches.

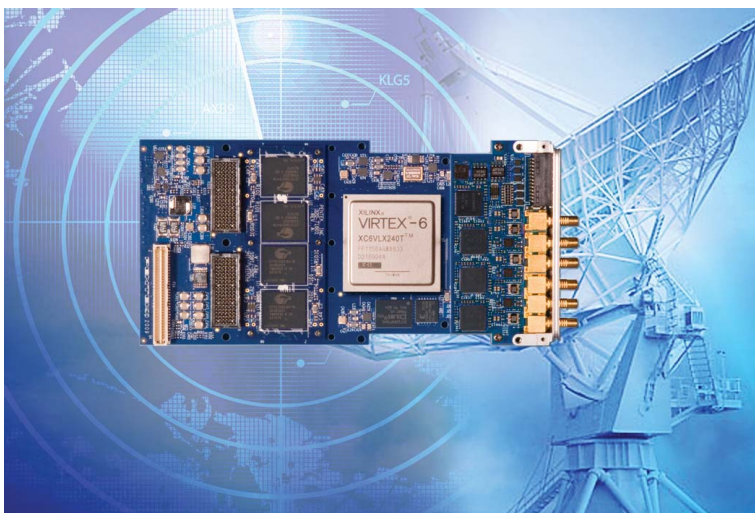
The whole idea of segregating data paths in the OpenVPX Multiplane Architecture is to minimize the possibility of conflicting data traffic. "The whole sense of contention goes away," Couture explains. "This model enables more processing in the platform in real time."

The right fabric for the right job

In this environment, systems integrators have some serious decisions to make when choosing which switch fabrics to use to meet system specifications, differentiate themselves from the competition, and create systems that are affordable. "It's an interesting design decision to architect which fabrics to use for which functions," says Pentek's Hosking.

"PCI Express might not be the best protocol for embedded systems. It was developed primarily as a motherboard expansion of PCI," Hosking says. "But you can find PCI Express easily and expensively. It's so popular because of the huge number of devices and silicon that use PCI Express to cover so many different functions."

At the same time, Serial RapidIO has advantages for complex embedded systems because it supports several different masters, and can support more variety in embedded systems than PCI Express can do easily, Hosking says. Would it make



The Cobalt Virtex6 module from Pentek Inc. is appropriate for use with high-speed serial switch fabric networking.

sense to use both in the same system? "We use both all the time," Hosking says.

Gigabit Ethernet is particularly useful for inter-system communications, Hosking continues. "We don't see it as much for real-time links between system elements as much as we see it for control and management functions among system elements. It has a lot of overhead, and Gigabit Ethernet was not designed to be extremely deterministic and low latency, but it is robust and will go through a 3-foot thick wall; that's the beauty of Ethernet."

For higher-speed data flow, however, systems designers should not dismiss 10-gigabit Ethernet. "10-gig Ethernet for some real-time data transfers can be useful because it has margins in the channel

over what you require," Hosking explains. "It's cheap, and parts are available." Echoes GE's Pepper, "10-gigabit Ethernet seems to be a real sweet spot on the data plane."

Serial RapidIO, meanwhile, works in a similar way to PCI Express for high-speed networking interconnects, yet it may be the better choice for extremely complex systems, Hosking says. "Since it supports multiple masters and processors in the system, it is a more elegant solution because each master can discover all devices connected, including processors. It can communicate with multiple processors,

and allow each processor to communicate with multiple peripherals. It has some more layers and overhead than PCI Express, but it gives you the freedom to architect a complex system."

Also for extremely complex systems, Mercury just introduced a protocol-agnostic, multi-fabric interconnect technology for embedded computing systems that are based on Intel microprocessors, called the Protocol Offload Engine Technology (POET), which forms a bridge between microprocessors and switch fabrics.

POET implements its intellectual property in Xilinx or Altera FPGAs and implements standard interfaces to bridge between processors and Serial RapidIO and 10 Gigabit Ethernet. Future releases will

support 40 Gigabit Ethernet and InfiniBand, as well as offload protocols such as RoCE (RDMA over Converged Ethernet), an InfiniBand-over-Ethernet standard.

One of the biggest advantages of POET's approach is ease of future upgrades, Couture says. "To make future architectural changes, engineers can change the IP in POET by altering its FPGA to support faster fabrics as they become available." POET's FPGA also can handle anti-tamper.



This array of VPX embedded computing boards from Pentek Inc. can be linked on switched serial fabrics.

TECHNOLOGY FOCUS

Gateway to optical computing

As switch fabrics progressively become faster and faster, systems designers also must consider if they want to implement fabrics as wire or optical interconnects on optical fiber or free-space lasers. Designers may face these decisions more quickly than they would like, because the faster a switch fabric moves data, the shorter its physical length can be when using copper wire.

"The migration from 10/100 Ethernet to Gigabit Ethernet was relatively painless, and now 40-gigabit and 100-gigabit Ethernet are starting to be looked at," says Curtiss-Wright's Frank. "Once you go beyond Gigabit, you move to a much shorter read in the network. Gigabit Ethernet can go to 500 meters over copper cable, but 10-gigabit is limited to 50 meters over copper." Use of 40-gigabit Ethernet over copper wire "is pretty much unheard of," he says.

Advances in telecommunications technology, however, is yielding affordable solutions for implementing extremely high-speed switch fabrics over optical fiber and free-space lasers. "All these interconnects are available in optical, and in Gigabit- and 10-gigabit Ethernet we have a lot of interest," Frank says.

The differences in cable runs between copper wire and optical are enormous. Systems designers, for example, could run Gigabit and 10-gigabit Ethernet over single-mode optical fiber for as far as 40

kilometers. Using low-cost fiber, designers could run Gigabit Ethernet for 100 to 500 meters, which for many applications is more than enough.

The differences in 40-gigabit Ethernet are even more dramatic. Using copper wire, engineers could move data no farther than 1 to 10 meters, whereas they

could run 40-gigabit Ethernet links for kilometers when using optical fiber, Frank says. Even with 100-gigabit Ethernet, interconnect links could run for kilometers. In addition to cable lengths, optical fiber or free-space laser interconnects also offer advantages in resistance to electromagnetic interference over copper cable. ●



The XPand3200 one-half ATR conduction-cooled embedded computing chassis from Extreme Engineering Solutions can be used with high-speed switch fabrics for high-end computing.



The XPand4200 one-half ATR air-cooled chassis from Extreme Engineering Solutions is for conduction-cooled boards, and can be used with switch fabric networking.



Modular Power Architecture



Compact 4W to 35W DC/DC
Wide input
MIL-STD-704



Bricks 75W to 150W DC/DC
Wide input 9-45/16-80/120-480 Vdc
MIL-STD-704, MIL-STD-1399



EMI filters, hold-up, pre-regulators
MIL-STD-461, MIL-STD-1275



35W to 350W PFC modules
115 Vac/47-800 Hz
MIL-STD-704, MIL-STD-1399



Multi purposes 100W DC/DC
Ultra wide input 10-100 Vdc
MIL-STD-704, MIL-STD-1275

For complete technical information please consult our web site :

www.gaia-converter.com

USA & CANADA
1-888-601-3169 ext. 202

PRODUCT INTELLIGENCE

For rugged radios, it's all about bigger networks and smaller sizes

By **JOHN McHALE**

Designers of rugged radios for the military focus on improving the network for the warfighter, while at the same time creating technologies that are more efficient in terms of size, weight, and power.

"Today, it is all about the network," says Joe Miller, director of Joint Tactical Radio System (JTRS) Ground Domain for General Dynamics C4 Systems in Scottsdale, Ariz. "Current operations demand better communications and warfighters need more bandwidth across secure seamless pipes. Networks must self form and auto route communications all without the benefit of fixed infrastructure—no cell towers. Real-time communications and situational awareness are critical, and current operations in rugged remote regions of the world require new networking technologies.

"However, the network is just an enabler," Miller continues. "The value lies in applications that run on the network. Applications provide information and intelligence that improves safety, increases effectiveness, and multiplies lethality."

The funding trends out of the U.S. Department of Defense (DOD) also are pushing toward a more efficient network, says Steve Marschilok, president of Department of Defense Business at Harris RF Communications in Rochester, N.Y. "The market and funding trends for military radios in the DOD are transitioning to wideband requirements as there is a pent-up demand for more and more data at the lowest echelons on the battlefield. Much like the commercial

world, data intensive applications like biometrics, intelligence, surveillance, and reconnaissance (ISR), video, and logistics are driving an increasing need for bandwidth."

Harris is meeting this demand with its Falcon III AN/PRC-117G, which is "the first wideband tactical radio that is both compliant with the JTRS Software Communications Architecture and NSA Type-1 certified," Marschilok says. This radio has been deployed by the U.S. Army and other services to mission areas.

"The current challenge is to develop effective human interfaces at the soldier level to disseminate this intelligence without adding significant size and weight," Miller says.

"From a product perspective, our military customers have placed emphasis on size, weight, power, and cost (SWaP-C) for new products," says Earl Johnson, vice president of business development at ITT Communications Systems in Fort Wayne, Ind. "Radios of the future will be required to have an open systems architecture and run various waveforms as dictated by the operational environment. Tactical ground forces are seeking satellite communications on the move (SOTM) and beyond line of sight (BLOS) capabilities for company and below units."

ITT's Soldier Radio Waveform (SRW) meets this demand and brings "the network to battalion and below units," Johnson continues. "We are developing smaller handheld radio capabilities that will exceed requirements for the JTRS Rifleman Radio. Our NexGen Iridium products, such as the RO Tactical Radio are providing BLOS capabilities to deployed forces in Iraq and Afghanistan. In addition, we have tested and demonstrated a SOTM with our GNOMAD system that brings on the move capability using a low-profile SAT-COM antenna."

"The Army has also expressed strong interest in bringing Smart



The Harris Falcon III AN/PRC-117G rugged, wideband tactical radio is compliant with the JTRS Software Communications Architecture, as well as National Security Agency (NSA) Type-1 certified.

Phone capabilities to the battlefield based on the commercial model of smart phones using various applications," Johnson says. "This is a low-cost, open system solution leveraging commercial technology. As new radios become cheaper and the military move to commercial-type smart phones, the ruggedization required may be relaxed in the future."

"Military standards for ruggedization really have not changed, nor have techniques to achieve ruggedization," Miller says. "What is new is miniaturization. The Joint Tactical Radio Systems (JTRS) Handheld, Manpack, Small Form Fit (HMS) leverages technologies from the commercial cellular industry to achieve increased capabilities in packages significantly smaller than current radios. The smallest HMS radio, used on unmanned aerial vehicles, weighs approximately 8 ounces."

"Ruggedization does become a challenge as density of electronics increases and size decreases," Miller says. "Special techniques are required to manage thermal dissipation and unique power savings modes are necessary as well. Within the HMS radio, individual circuits can be shut down for fractions of a second to conserve battery life and reduce thermal loading." ●

COMPANY INFORMATION

Ericsson

Plano, Texas
972-583-0000
www.ericsson.com

General Dynamics C4 Systems

Scottsdale, Ariz.
480-441-3033
www.gdc4s.com

Harris RF

Rochester, N.Y.
585-244-5830
www.harris.com

ITT Communications

Fort Wayne, Ind.
260-451-6000
www.cs.itt.com

Motorola

Schaumburg, Ill.
847-576-1000
www.motorola.com

Thales Communications

Clarksburg, Md.
240-864-7000
www.thalescomminc.com



SPARTAN⁶

- Easy-to-use, low power, serial transceivers support up to 3.125Gbps to enable industry standards such as PCIe[®]
- Low voltage option reduces total power consumption by 65% over previous generations
- Integrated DSP, memory controllers, and clocking technology simplifies designs

VIRTEX⁶

- High bandwidth serial connectivity with up to 72 low-power transceivers supporting up to 11.18Gbps
- Ultra high-performance DSP using up to 2016 low-power, performance-optimized DSP slices
- Integrated high-performance ExpressFabric[™] technology running at 600 MHz clocking and performance-tuned IP blocks
- Proven cost-reduction with EasyPath[™]-6 FPGAs

Potential. Realized.

Unleash the full potential of your product design with Xilinx[®] Virtex[®]-6 and Spartan[®]-6 FPGA families — the programmable foundation for Targeted Design Platforms.

- Reduce system costs by up to 60%
- Lower power by 65%
- Shrink development time by 50%

Realize your potential. Visit www.xilinx.com/6.

© Copyright 2010 Xilinx, Inc. All rights reserved. Xilinx and the Xilinx logo are registered trademarks of Xilinx in the United States and other countries. All other trademarks are property of their respective holders.



ELECTRO-OPTICS WATCH

Hybrid laser/RF communications for use in atmospheric turbulence to link space, aircraft, and land sites

BY JOHN KELLER

LAUREL, Md.—Optical communications experts at the Johns Hopkins University Applied Physics Laboratory, Laurel, Md., will design and demonstrate a hybrid, free-space optical communications and radio-frequency data modem to provide a reliable, fast communications link among spacecraft, aircraft, military vehicles, ground installations, and ships at sea.

Johns Hopkins scientists are doing the RF and laser communications work under terms of a \$35.9 million contract awarded by the U.S. Defense Advanced Projects Agency (DARPA) Strategic Technology Office in Arlington, Va., as part of the DARPA Optical Modem project.

Johns Hopkins engineers will design and test an optical modem that will allow



A prototype laser/RF communications link designed to enable aircraft to communicate at high speeds in turbulent conditions will operate on large aircraft, such as the P-3 maritime patrol aircraft, shown above.

multi-gigabit per second, hybrid laser-RF communications at long range, and under extreme atmospheric turbulence and cloudy conditions.

Continued on page 41

Night-vision, image-intensifier tubes couple to digital cameras with relay lenses in digital-age upgrades

By JOHN KELLER

EAGLEVILLE, Pa.—The pursuit of network-centric warfare and the digital battlefield is fueling attempts to re-invent the analog

image intensifier tube common to night-vision goggles (NVG) and other kinds of night-fighting equipment to enable this low-light sensor to produce digital imagery



Analog image-intensifier tubes in night-vision goggles are getting a second lease on life by coupling with digital cameras with relay lenses.

Army orders night-vision goggles and scopes from Night Optics USA under terms of \$8.2 million contract

U.S. Army officials are awarding an \$8.2 million contract for night-vision equipment to Night Optics USA Inc. in Huntington Beach, Calif. The contract involves a variety of night-vision goggles, night-vision scopes, and training. Officials of the Army Communications-Electronics Command (CECOM) at Fort Monmouth, N.J., awarded the contract Friday to Night Optics USA for 110 night optics/binocular night-vision device-15 (NO/BNVD-15) night-vision goggles; 136 night optics/passive vision-14 (NO/PV-14) advanced multi-purpose scopes; 100 of NO/PVS-14-3w/5x; three NO/BNVD-15 purge adaptors; 145 passive vision sight-14 (PVS-14) maintenance spares kits; operator spares; and training for the NO/BNVD-15. Work will be in Huntington Beach, Calif., and will be finished in late 2019. Awarding the contract is the CECOM Contracting Center at Fort Monmouth, N.J. For more information, visit CECOM online at www.army.mil, or Night Optics USA at www.nightoptics.com.

Rugged, lightweight shortwave infrared lenses with low F numbers introduced by Clear Align

Clear Align in Eagleville, Pa., is introducing the INSPIRE line of lightweight, high-performance shortwave infrared (SWIR) lenses for short-wavelength infrared detection in applications such as unmanned vehicles, military night vision, search and rescue, and infrared tracking. This series of pre-engineered SWIR lenses have F-numbers as low as 1.0. The Modulation Transfer Function enables the SWIR lenses to provide high-resolution imaging across the 0.6- to 1.7-micron imaging band. The ruggedized mechanical design allows the lenses to withstand harsh environments, and is athermalized from -20 to 60 degrees Celsius. "Our customers asked us for a lightweight SWIR capability enabling higher-resolution operations at lower light levels for man-portable and UAV applications," says Michael Finlan, vice president of imaging at Clear Align. For more information, visit Clear Align online at www.clearalign.com.

Night vision from page 40

that can be shared over tactical networks and viewed on digital displays.

The analog image-intensifier tube is a staple of more than half a million existing night-vision sensors, such as the AN/PVS-14 night-vision monocular. Although these devices remain valuable for night vision in military and law-enforcement applications, the images they produce are not much use to anyone beyond the person looking into the night-vision device.

Electro-optics systems designers, however, are starting to consider additions to the venerable image-intensifier to convert its analog signal into digital data. Designers are doing this by coupling the image-intensifier tube to digital cameras by adding fast relay lenses. Do this, and imagery from the tube can be viewed on digital displays, sent over digital networks to nearby forces and higher command authorities, or processed for multispectral imaging.

"Everyone wants to see things digitally," explains Angelique Irvin, president and chief executive officer of electro-optics specialist Clear Align in Eagleville, Pa. Clear Align and other electro-optical companies like Electrophysics Corp. in West Fairfield, N.J., are providing the fast relay lenses that help convert image-intensifier tube signals into digital information.

Relay lenses can convert images from one size to another without losing any light. The relay lens transmits the tube's image to a digital camera, which records the information for storage, transmitting on a network, or for additional digital signal processing to fuse the tube's imagery with other sensors or for enhancement for intelligence analysts.

Irvin explains there are two ways to couple photos and video from an image-intensifier tube to a digital camera: either use a fast relay lens, or use a fiber-optic taper, which like a relay lens converts an image from small to large, or from large to small.

Irvin cautions that using a fiber-optic taper not only is expensive, but also is a permanent solution. "People will still use those night-vision goggles," Irvin says. "With a relay lens, you can pop a camera on it and look at images on a screen, rather than through the NVG lenses."

For more information, contact Clear Align online at www.clearalign.com, or Electrophysics Corp., a Sofradir Group Company, at www.electrophysics.com. ●

www.milaero.com

Lockheed Martin and Raytheon to develop high-power laser technology for future military laser weapons

By **JOHN KELLER**

HUNTSVILLE, Ala.—military laser weapons researchers are asking two major U.S. defense contractors to develop electrically driven high-power laser technology for future generations of laser weapon systems.

The contracts call for Lockheed Martin and Raytheon to capitalize on high-energy laser technology developed during the past five years to demonstrate 25-kilowatt military lasers, and design ruggedized military laser weapon subsystems at powers as strong as 100 kilowatts.

The U.S. Army Space Missile Defense Command in Huntsville, Ala., is awarding a \$14.7 million contract to the Lockheed Martin Mission Systems & Sensors (MS2) Integrated Defense Technologies segment in Bothell, Wash., and a \$9.1 million contract to the Raytheon Co. Space and Airborne Systems segment in El Segundo, Calif., for the Robust Electric Laser Initiative (RELI) program.

Army Space Missile Defense Command is awarding the contracts also on behalf of the DOD High Energy Laser Joint Technology Office (HEL JTO), the Air Force Research Laboratory (AFRL), and the Office of Naval Research (ONR).

DOD researchers want Lockheed Martin and Raytheon to develop an efficient, high-power, electrically driven laser system suitable for a scalable, ruggedized laser module packaged for ground-, sea-, or air-based military applications. Ultimately, experts at the two companies will build laboratory-grade lasers with performance traceable to weapon system applications.

DOD researchers want the companies to develop high-power, weapons-grade lasers with better than 30 percent efficiency, with beams near diffraction limited quality with power greater than 25 kilowatts with run times that meet military mission requirements.

Lockheed Martin and Raytheon

engineers will demonstrate and test the lasers they develop at the DOD High-Energy Laser System Test Facility at White Sands Missile Range, N.M.

For more information, visit Lockheed Martin Mission Systems & Sensors online at www.lockheedmartin.com/ms2, or Raytheon Space and Airborne Systems at www.raytheon.com. ●

Hybrid from page 40

Hopkins experts will blend free-space optical (FSO) and radio-frequency (RF) communications terminals and non-deterministic network routers. DARPA is sponsoring this research, together with the Naval Research Laboratory in Washington and the Air Force Research Laboratory at Wright-Patterson Air Force Base, Ohio.

Hopkins will provide as many as eight free-space optical terminals with advanced optical modems, as many as four hybrid FSO/RF network routers and node controllers, and related equipment for three test aircraft and one ground station for field testing.

The prototype system should be able to operate on large aircraft, such as the Navy P-3 Orion, at altitudes as high as 25,000 feet, at distances as far as 125 miles air-to-air and 30 miles air-to-ground, at data rates of 10 gigabits per second and 270 megabits per second, respectively, and with near-perfect reliability and error-free operations.

The optical modem, including its optical automatic gain control (OAGC) and forward error correction, is the key subsystem for compensating for large channel fading to yield an error-free, 10-gigabit-per-second data rate in atmospheric turbulence.

Officials from DARPA, the Navy, and the Air Force will evaluate the integrated system at places like the Nevada Testing and Training Range (NTTR) or White Sands Missile Range. ●

PRODUCT APPLICATIONS

CHASSIS AND ENCLOSURES

Avionics chassis and electronic components for combat air control system provided by Curtiss-Wright

Targeting and communications software specialist Stauder Technologies in Saint Peters, Mo., needed avionics chassis and electronic components for the company's AVT StrikeLink Airborne solution (StrikeLink/A). They found their needed solutions from Curtiss-Wright Controls Inc. in Charlotte, N.C.

StrikeLink/A provides turnkey interoperability with StrikeLink, the material ground solution for the target location, designation, and hand-off system (TLHDS) program for the U.S. Marine Corps Systems Command, by re-hosting digital communications technologies in legacy aircraft. The contract is worth \$3.2 million.

At the heart of StrikeLink/A is Stauder's

digital communications software fielded in StrikeLink, which enables the ground operator to acquire targets quickly during day, night, and nearly all-weather visibility conditions.

StrikeLink can determine operator location precisely as well as that of their targets, and then digitally transmit secure data, using variable message format (VMF) protocols, to several supporting arms elements.

With StrikeLink/A installed on close air support aircraft, initially the AV-8B Harrier jump jet, digital communication interoperability is guaranteed and sustainable without modifying the aircraft's operational flight program or hardware installation provisions.

"Curtiss-Wright's expertise in the integration of rugged aerospace and defense subsystems, strong engineering and program management skills offered Stauder



Technologies the best overall value for their program," says David Adams, co-chief operating officer of Curtiss-Wright Corp.

Curtiss-Wright's integrated subsystems, including avionics chassis, computer boards, backplane, and power supply, will measurably contribute to digital interoperability between ground forces and close air support aircraft. For more information, visit Curtiss-Wright online at www.cwcontrols.com, or Stauder Technologies at www.staudertech.com.

AVIONICS

Missile warning systems from Northrop Grumman to equip Marine Corps medium- and heavy-lift helicopters

U.S. Marine Corps officials needed infrared missile warning systems to protect their fleets of medium- and heavy-lift helicopters from heat-seeking missiles—particularly from shoulder-fired ground-to-air missiles. They found their solution from the Northrop Grumman Corp. Electronic Systems sector in Rolling Meadows, Ill.

Officials of the U.S. Naval Air Systems Command (NAVAIR) at Patuxent River Naval Air Station, Md., are awarding an \$80 million contract to provide infrared missile warning systems (IRMWS) and processors

and control indicators in the Navy's Large Aircraft Infrared Countermeasures laser missile defense systems for Navy and Marine Corps helicopters.

Northrop Grumman's LAIRCM system, installed or scheduled for installation on more than 500 military aircraft, automatically detects a missile launch, determines if it is a threat, and activates a high-intensity laser-based countermeasure system to track and defeat the missile. These missile-warning systems will enable these helicopters to fly in and out of areas previously denied to them where threats from infrared-guided missiles were considered too severe, say Northrop Grumman officials.

Northrop Grumman will deliver more than 450 infrared missile warning systems and 90 processors to the Navy. "Protecting vulnerable, rotor-wing aircraft during this era of irregular warfare is paramount," says Carl Smith, vice president of infrared countermeasures for Northrop Grumman's Land and Self Protection Systems Division.

For more information, visit Northrop Grumman Electronic Systems online at www.es.northropgrumman.com.



for 156 Navy and Marine Corps CH-53D, CH-53E, and CH-46E helicopters. This hardware will work together with Northrop Grumman's Guardian laser transmitters

RGB Spectrum in Alameda, Calif., took part in the capping of the Deepwater Horizon Well in the Gulf of Mexico to stop the oil spill creating a huge oil slick that may take months or years to clean up. Handling the work to cap the well were deepwater remotely operated vehicles (ROVs) controlled aboard ships by an integrated control system using RGB



Spectrum MediaWall displays.

Each ROV unmanned underwater vehicle communicates video images from its cameras to a control ship where an operator manipulates the ROV's mechanical arms. The MediaWall concentrates camera imagery with other operating data to provide ROV operators with enhanced situational awareness for the sophisticated work nearly 5,000 feet under water.

MediaWall processors are real-time, display wall systems for arrays of projectors,

DISPLAYS

Oil spill capping to keep oil slick in check aided by Media Wall technology from RGB Spectrum

The MediaWall image display system from

cubes, or flat-panel displays. The MediaWall 4500 processor, for example, can display as many as 30 graphics and video signals on as many as 12 screens in a 3-by-4 array. Graphics signals are selectable up to 1920 by 1200 and 2048 by 1152 pixels.

Recent estimates indicate that as much as 180 million gallons of crude oil have leaked from the well since the fire and explosion on the Deepwater Horizon drilling platform last April. BP Plc, which is responsible for the disaster and clean up efforts, used remotely operated vehicles during the evaluation of the well's status and to implement all recovery and repair procedures.

For additional information, visit RGB Spectrum online at www.rgb.com.

MODELING AND SIMULATION

Army chooses SAIC and L-3 for missile defense modeling and simulation

Leaders of the U.S. Army Space and Missile Defense Command in Huntsville, Ala., are choosing Science Applications International Corp. (SAIC) in San Diego, and L-3 Communications Government Services segment in Chantilly, Va., to develop critical technologies for modeling and simulation of space and missile defense systems.

The companies will do the work under terms of two contracts with a combined potential value of \$641.9 million. SAIC will receive a maximum of \$343.7 million, and L-3 will receive as much as \$298.2 million.

These contracts involve the Army's Warfighter Modeling, Simulation, Analysis, and Integration Support (WMSA&IS) program to provide the Army and U.S. Department of Defense (DOD) with an advanced capability for modeling, simulation, analysis, and integration of space and missile defense issues and technologies.

SAIC and L-3 will compete for Army task orders as they arise in this program as Army experts identify specific requirements. The contractors will develop critical technologies to model and simulate

missile defense process-target sensing, intelligence, and sensor information and database fusion, command and control, target execution, and damage assessment.

There is a three-year basic period of performance, and two 2-year optional periods of performance. The WMSA&IS efforts will use tools based on traditional simulation and statistical modeling while incorporating the insight of man-in-the-loop simulation. The WMSA&IS efforts will combine geographically dispersed existing and future simulation components and architectures.

For more information, visit the Army Space and Missile Defense Command online at www.smdc.army.mil, SAIC at www.saic.com, and L-3 Government Services at www.l-3com.com.

WIRING HARNESES

LaBarge to provide complex wiring harnesses for Atlas V rocket

Rocket designers from the United Launch Alliance (ULA) LLC in Littleton, Colo., need complex wiring harnesses for the Atlas V single-use rocket, which is designed to launch satellites into orbit. They found their solution from LaBarge Inc. in St. Louis.

ULA awarded LaBarge a \$4.9 million contract to continue to produce wiring harness technology for the Atlas V expendable launch vehicle. ULA is a joint venture of The Boeing Co. and Lockheed Martin Corp. that builds rockets for launching satellites. The Atlas V uses a Russian RD-180 engine in its first stage, and an American RL10 engine in its upper stage. Some use Aerojet strap-on boosters.

LaBarge will do the work in Berryville, Ark., and should be finished by late 2013. LaBarge has made wiring harnesses and select hardware assemblies for the Atlas family of launch vehicles for the past 17 years. Last February marked the 20th Atlas V launch since the program began in 2002, and the 80th consecutive launch in the Atlas family supported by LaBarge.

ULA's Atlas V, Delta IV, and Delta II provide launch services for the U.S. Air Force, NASA, and National Reconnaissance Office. For more information, visit LaBarge

online at www.labarge.com, or the United Launch Alliance at www.ulalaunch.com.

DISPLAYS

French military chooses TopOwl helmet-mounted sight and display from Thales for Tiger helicopter pilots

French military Tiger helicopter pilots in Afghanistan needed night vision and targeting capability. They found their solution in the TopOwl helmet-mounted sight and display system (HMSD) from Thales Aerospace in Neuilly-sur-Seine, France.

The Thales TopOwl offers conformal piloting symbology, dark night-vision performance, and targeting together with comfort and fatigue reduction. TopOwl military night-vision performance has been upgraded to reach level 5, which corresponds to levels of visibility equivalent to a cloudy night with




no moon, no peripheral light source, and no starlight, Thales officials say.

By projecting intensified images onto the helmet visor, TopOwl offers a seamless transition between head-up piloting and head-down instrument monitoring, together with a balanced center of gravity to help reduce pilot fatigue from standard night-vision goggles, company officials say.

TopOwl is also capable of switching from intensified image projection to high-resolution infrared image projection with one click for improved visibility and safe flight operations in degraded visual conditions like brownout, white-out, and nighttime flying.

TopOwl is installed in five helicopter programs: Tiger, NH90, Cobra AH-1Z, Huey UH-1Y, and Rooivalk. More than 700 helmets have been delivered, and more than 1,500 systems will be in service over the next 10 years. It has been chosen by 15 countries for their army, navy, and/or air force attack and transport helicopters.

For information, visit Thales Aerospace at www.thalesgroup.com/aerospace. 



www.milaero.com

MILITARY & AEROSPACE ELECTRONICS | September 2010 | 43

NEW PRODUCTS

To submit new products for consideration, contact John Keller by e-mail at jkeller@pennwell.com

» POWER ELECTRONICS

DC-DC converter for CPUs introduced by Murata Power

Murata Power Solutions Inc. in Mansfield, Mass., is introducing the HPQ-12/25-D48, a 300-watt, high-power, quarter-brick isolated DC-DC converter with 12-volt output. Ripple and noise specifications for the power electronics device assure compatibility with circuits using CPUs, ASICs, programmable logic, and FPGAs. For battery-powered and telecommunications equipment,



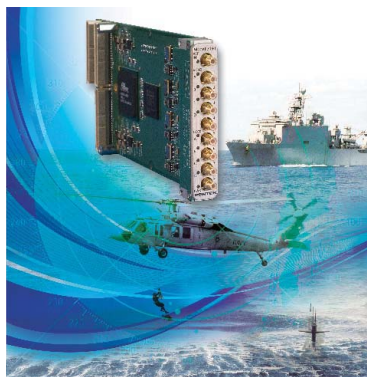
applications for the HPQ-12/25-D48 include small instruments, area-limited microcontrollers, data communications equipment, remote sensor systems, and vehicle and portable electronics. The power supply has a 2:1 input range of 36 to 75 volts and output of 12 volts, plus output current as high as 25 amps in an industry-standard, quarter-brick package measuring 2.3 by 1.45 by 0.44 inches. The HPQ-12/25-D48 has efficiency as high as 94.5 percent. The HPQ-12/25-D48 operates within the industrial temperature range of -40 to 85 degrees Celsius. The power supply is designed to meet UL/EN/IEC 60950-1 2nd edition safety approvals and is RoHS-6 compliant. Options include: a baseplate, which boosts the HPQ-12/25-D48's thermal performance; conformal coating; trim and sense functionality; and various pin lengths. For more information, visit Murata Power online at www.murata-ps.com.

» BOARD PRODUCTS

Programmable clock synthesizer PMC introduced by Pentek

Pentek Inc. in Upper Saddle River, N.J.,

is introducing the user-configurable Model 7191 programmable clock synthesizer PCI Mezzanine Card (PMC) module. The new product is designed for radar, communications, and other applications using A/D converters and D/A converters that need a precise clock source. The Model 7191 PMC provides designers working with A/Ds and D/As not only a clock source, but also custom frequency generation under simple software control. "Multichannel A/D and D/A systems for most radar and communications applications require synchronized sampling using precision clocks," says Rodger Hosking, vice president of Pentek. "The Model 7191 is ideal when the desired clock frequency is not initially known, such as in laboratory systems or field-configurable deployed applications." The board product for embedded systems can replace bulky and expensive frequency synthesizers in systems that need several high-quality clock signals, all phase locked to a system reference. The Model 7191 for embedded computing systems uses low-noise VCXOs for the fundamental frequency generation. The VCXO output is followed by a clock synchronizer from Texas Instruments to allow synchronization



with common frequency reference sources. For more information, visit Pentek online at www.pentek.com.

» EMBEDDED COMPUTING

Industrial-rugged CPU board for vision, automation, and control introduced by ADLINK

ADLINK Technology Inc. in San Jose,

Calif., is offering the NuPRO-E330 PICMG 1.3 full-sized system host board (SHB) for applications that need high-performance computing, data security, and maximum data access bandwidth, such as industrial control, automation, and industrial vision. The NuPRO-E330 embedded computing board products support next-generation Intel Core i7/i5/i3 processors at clocks speeds as



fast as 3.33 GHz and as much as eight gigabytes of dual-channel DDR3 1066/1333 MHz memory in two DIMM slots. Equipped with the Intel Q57 Express Chipset to provide I/O technologies and high data transfer rates, the NuPRO-E330 computer boards are for modern industrial applications where remote management and data protection are critical. The NuPRO-E330 CPU board supports Intel active management technology 6.0 (Intel AMT 6.0), which enables users to manage assets remotely, reduce downtime, and minimize on-site visits. The NuPRO-E330 single-board computer has an Intel Core i7 processor supporting Intel turbo boost technology that enables processor cores to run faster than the rated operating frequency if the processor is operating below power, temperature, and current specification limits. For more information, visit ADLINK online at www.adlinktech.com.

» POWER ELECTRONICS

Bulk front-end AC-DC power supply introduced by Emerson

Emerson Network Power in Carlsbad, Calif., is introducing the DS460S-3 bulk front-end AC-DC power supply for applications that use distributed power architectures, such as computers, data storage, networking, data communications, as well as test and measurement. The DS460S-3 power

supply is 92 percent at 50 percent full load. With a 1U-by-2U form factor and measuring 7.75 inches long, the DS460S-3 is for length-limited applications and mid-plane design configurations and, at a height of 1.6 inches, is for use in 1U rack-mounting equipment. Rated at 460 watts, the DS460S-3 power supply generates a main payload output of 12 volts DC and an auxiliary output of 12 volts DC for powering standby circuitry. It features an input voltage of 90 to 264 volts AC and uses active power factor correction to minimize input harmonic current distortion and to comply with the international EN61000-3-2 standard, with a power factor of 0.99 typical. Digitally programmable, the DS460S-3 is equipped with an I2C interface available with industry-standard PMBus communications protocol. The DS460S-3 also features a built-in, low-noise smart fan and holds safety certifications from UL/cUL, NEMKO, CB, and CE. For more information, visit Emerson Network Power online at www.powerconversion.com.

» COMPONENTS

Silicon carbide transistor for UHF pulse radar introduced by Microsemi

The Microsemi Corp. RF Integrated Solutions (RFIS) segment in Sunnyvale, Calif., is introducing the model 0405SC-2200M silicon carbide (SiC) transistor with 2,200 watts of peak RF power for high-power UHF band pulsed radar applications. The 0405SC-2200M transistor is a generation 3 chip in its geometry, materials, processing, and packaging, Microsemi officials say. It is designed in a one-ended package for common gate 2,200 watt Class AB performance in the UHF frequencies from 406 MHz to 450 MHz for UHF pulsed radar. A hermetically sealed package built with high-temperature gold metallization and wires provides reliability and improved system yields. Additional system benefits include simplified impedance matching, a 125 volt operating voltage, low conducting current, and high peak power for reduced system power. Microsemi RFIS

is the former Endwave Corp. Defense Electronics and Security (D&S) business. For more information, visit Microsemi RFIS online at www.microsemi-rfis.com.

» SENSORS

Position and displacement sensors for extreme environments introduced by Kaman

Kaman Precision Products-Measuring in Middletown, Conn., is introducing high-precision position sensors and systems for non-contact displacement and position feedback in harsh environments. All Inconel construction makes them suitable for corrosive gas, liquid, and radiation environments. Measurement quality is unaffected by most corrosive gasses and liquids and other environmental contaminants, such as oil, dirt, radiation, and stray RF and magnetic fields. These high-temperature sensors were designed initially to measure steam turbine shaft runout in nuclear power plants. They



also have been used to measure nuclear fuel rod vibration, shaft vibration/run-out in rocket engine liquid fuel pumps, chemical processes, research projects, and high-temperature processing. Kaman's extreme sensing systems use a dual-coil sensor design to minimize thermal and radiation effects. The common mode rejection provided by the symmetrical design of the dual coils compensates for constant and slowly changing temperatures from -320 to 77 F, or from 77 to 1,000 F. For more information, visit

Kaman Precision Products-Measuring online at www.kamansensors.com.

» RUGGED COMPUTING

PC rugged computer introduced by Stealth.com

Rugged computer specialist Stealth.com Inc. in Woodbridge, Ontario, is introducing the model LPC-100 mini PC computer for applications that require powerful solutions in small spaces, such as embedded control, digital signs, kiosks, mobile navigation,



thin-clients, POS, human/machine interfaces, and embedded computing. The machine is Stealth.com's smallest PC to date. The Stealth ultra-small PC measures 4 by 6.1 by 1.45 inches—about the size of a paperback novel—and weighs 1.2 pounds, Stealth.com officials say. An optional, solid-state drive is available for applications that require extra high shock and vibration, as well as wide temperature ranges. Stealth's space-saving computer uses the Intel Mobile GM45 Express Chipset with Intel's graphic media accelerator with 3D graphics performance. The LPC-100 is available with a standard 1.9 GHz Intel Dual Core Celeron T3100 or optional Intel Core 2 Duo P8400 2.26 Ghz processors or 2.53 Ghz T9400 processor. Systems are compatible with Microsoft Windows 7/XP, Linux, and similar PC operating systems, and can be custom configured. For more information, visit www.stealth.com.

» COMPONENTS

Circular wire rope isolators from AAC sport low profile

A series of 18 compact, low-profile circular wire rope isolators from

» NEW PRODUCTS

Advanced Antivibration Components (AAC) feature multiaxial shock and vibration protection, corrosion-resistance, maintenance-free operation. The cable itself is made from stainless steel and the mounting plates are made of aluminum. These V10Z69 Series mounts are stocked in 1/16-, 3/32-, 1/8-, 3/16-, and 1/4-inch diameter sizes. Applications include computers, electronics, generators, motors, and pumps. AAC offers a range of shock and vibration isolation products, which include stud and nut type mounts, base plate fastened mounts, wheels, leveling and foot mounts, suspension mounts, spring, steel mesh and cable mounts, bumpers, and channel mounts, bushings and grommets, and couplings. Many are suitable for use in extreme environmental conditions.

» COMPONENTS

Bump adapters from Aries help designers use high-pitch devices on small-pitch boards

Aries Electronics Inc. in Bristol, Pa., is introducing fine pitch bump adapters that accommodate boards with pitches down to 0.4 millimeters to enable embedded systems designers to use high-pitch devices on small-pitch boards. The adapter tops have landing pads that can be designed to accept any device on any pitch and settle into fine-pitch footprints, including thin-shrink small outline packages (TSSOP) and quad flat packages (QFP) with pitches as small as 0.4 millimeters. In addition, the adapter bottom has connection pads raised as high as 0.01 inches. Due to the open space available on the top of the adapter board, manufacturers can add

components to the design at a minimal cost, company officials say. Fine-pitch bump adapters help integrate high-pitch BGA devices with boards laid out with small pitches that typically could not be used together. The apparatus can operate in temperatures to 105 degrees



Celsius for FR4 and 130 C for lead-free. For more information, visit Aries Electronics online at www.arieselec.com.

» PRODUCT & LITERATURE SHOWCASE

INTEGRATED AV SOLUTIONS

FOR THE

MODERN OPERATIONS CENTER



Call us to learn how our new MultiPoint KVM™ solution will revolutionize your control room.



950 Marina Village Parkway Alameda, California 94501 Tel: (510) 814-7000 Fax: (510) 814-7026 Web: www.rgb.com E-mail: sales@rgb.com

PRODUCT & LITERATURE SHOWCASE



ST-9020 rugged computer system with 20" display, MIL STD shock & vibration qualified



DU-19/U rugged monitor

For full line of rugged systems contact:

IBI SYSTEMS, INC.
6842 NW 20TH AVE, FORT LAUDERDALE, FL 33309
PHONE: 954-978-9225, WEB: www.ibi-systems.com

DATA STORAGE TECHNOLOGY

RPC12 Ruggedized 3U Fibre Channel RAID System

Phoenix International designs and builds rugged COTS Data Storage Systems that plug and play in any application -- from Multi-Terabyte Fibre Channel RAID and Storage Area Network configurations to plug-in Solid State Disk Drive VME/cPCI Storage Modules.

Low Operational Temperature
-20°C

High Operational Temperature
+60°C

Operational Altitude to 45,000 feet

- Operational altitude to 45,000 feet
- Operational Temperature -20° to +60°C
- Redundant, hot swap components/FRU's
- 40Hz to 440Hz, 90/240 VAC Input Operation

PHOENIX INTERNATIONAL

See us at: www.phenixint.com or contact us at: 714-283-4800 • info@phenixint.com
An AS 9100 / ISO 9001:2000 Certified Service Disabled Veteran Owned Small Business

We Put the State of the Art to Work™

ADVERTISERS INDEX

ADVERTISER	PAGE
3D PLUS.....	24
AEROFLEX COLORADO SPRINGS.....	8
AEROFLEX METELICS.....	20
AEROFLEX PLAINVIEW.....	25
AETHERCOMM.....	11
AMERICAN AEROSPACE CONTROLS.....	23
BITTWARE.....	27
CRANE AEROSPACE & ELECTRONICS.....	22
CRYSTAL GROUP.....	17
CURTISS-WRIGHT CONTROLS EMBEDDED COMPUTING.....	C4
DIGITAL SYSTEMS ENGINEERING.....	19
EIC SOLUTIONS.....	34
ELMA ELECTRONIC.....	30
EXTREME ENGINEERING SOLUTIONS.....	1
GAIA CONVERTER, INC.....	37
IBI SYSTEMS, INC.....	47
INTERNATIONAL RECTIFIER.....	3
ISI/NALLATECH.....	35
KONTRON AMERICA.....	31
M.S. KENNEDY CORPORATION.....	32
MARTEK POWER ABBOTT, INC.....	7
MERCURY COMPUTER SYSTEMS.....	2
OMNETICS CONNECTOR CORP.....	14
PANASONIC COMPUTER SOLUTIONS COMPANY.....	13
PHOENIX INTERNATIONAL.....	47
PICO ELECTRONICS, INC.....	9, 12
RGB SPECTRUM.....	46
SPECTRUM CONTROL.....	33
SYNQOR.....	15
TDI POWER.....	18
TEWS TECHNOLOGIES.....	47
THEMIS COMPUTER.....	29
VICOR CORPORATION-BRICK BUSINESS UNIT.....	21, C2
VICOR CORPORATION-CHIP BUSINESS UNIT.....	5
VPT INC.....	26
XILINX.....	39

www.milaero.com

COTS I/O Solutions for: IndustryPack®, PMC, CompactPCI, PCI with Outstanding Software Support.

- CPU Carriers
- IP and PMC Carriers
- Ethernet
- Communication
- CAN Bus
- Field Bus
- Digital I/O
- Analog I/O
- PC Card/CardBus
- Motion Control
- Memory
- User-programmable FPGA



- VxWorks
- Linux
- Windows
- LynxOS
- QNX

TEWS TECHNOLOGIES

TEWS TECHNOLOGIES LLC: 9190 Double Diamond Parkway, Suite 127 • Reno, NV 89521/USA
Phone: +1 (775) 850 5830 • Fax: +1 (775) 201 0347 • E-mail: usasales@tews.com

TEWS TECHNOLOGIES GmbH: Am Bahnhof 7 • 25469 Halstenbek/Germany
Phone: +49 (0)4101-4058-0 • Fax: +49 (0)4101-4058-19 • E-mail: info@tews.com

DEFENSE EXECUTIVE

Martek Power moves into laser power supply market

Leaders of power electronics specialist Martek Power Inc. in Torrance, Calif., are boosting their company's expertise in laser power supply and lighting power supply applications with their acquisition of Laser Drive Inc. in Gibsonia, Pa. The newly acquired company has been renamed Martek Power Laser Drive LLC. "Our customers will greatly benefit from the combining of Laser Drive's technology with Martek Power's manufacturing expertise," says Martek Power president Mike Innab. "Martek



Power will help Laser Drive address market segments that we have not been able to in the past," says Phil Thackray, director of research and development at Martek Power Laser Drive. The acquisition will enhance Martek Power's presence in the laser and lighting power supply market where the company can take advantage of significant opportunities for

growth, company officials say.

more  <http://bit.ly/aCOIX7>

GO

MILAERO BLOG

Democrats in Congress get pound of flesh from military

Interesting story in *The New York Times*, entitled "Pentagon Faces Intensifying Pressures to Trim Budget." The thrust of the story is this: The wars in Iraq and Afghanistan are winding down, which leads the Democrat majority in Congress to consider reducing current and future defense budget requests for the first time since 9/11. Defense Secretary Robert Gates, meanwhile, is trying to stave off Pentagon budget cuts by convincing Democrats in Congress that he can make the military more efficient, and use money saved to pay for military procurement, operations, military research and development, and other costs.

more  <http://www.militaryaerospace.com/index/blogs/>

AVIONICS INTELLIGENCE

Avionics fiber-optics market to double by 2013

Analysts at IGI Consulting say in a new study that the military and aerospace avionics market for fiber-optics components, sub-systems, and systems will more than double by 2013. IGI's new report—"Military and Aerospace Fiber Optics in Avionic Systems"—includes military and commercial aircraft, including fighter aircraft, transport aircraft, unmanned aerial vehicles (UAVs), and commercial aircraft. IGI analysts say they estimate the total fiber-optic market for these two segments at \$306 million in 2009, growing to \$703 million in 2013. The increase is due to factors such as greater acceptance of this new technology driven by the rapid acceptance and developments in the telecommunications field; the need to reduce size, weight and power; the need for higher bandwidth; and the opening of the UAV market.

more  <http://www.avionics-intelligence.com>

GO

COMMAND POST COMMUNITY

B83 JTA undergoes flight test

National Nuclear Security Administration (NNSA), in collaboration with the U.S. Air Force, conducted a flight test using a Joint Test Assembly (JTA) of the B83 Modern Strategic Bomb. The JTA contains sensors and instrumentation that monitor weapon hardware performance during flight tests to ensure that the weapon functions as designed. "JTA tests are an integral part in ensuring that

all weapon systems perform as planned and designed, and that our stockpile remains safe, secure, and effective," says Brig. Gen. Garrett Harencak, NNSA principal assistant deputy administrator for military application. "The strong working relationship between NNSA and Department of Defense is vital to national security and we are committed to strengthening the relationship between the entities."

more  <http://community.milaero.com>



ONE WORLD. ONE SOURCE. ONE HUNDRED YEARS.

PUBLICATIONS • EVENTS • DIGITAL MEDIA

Since 1910, PennWell has embraced a mission of transforming diverse information into practical business intelligence for strategic markets worldwide. A diversified, multi-media company, PennWell serves the oil and gas, electric power, renewable energy, water, electronics, optoelectronics, fire, emergency services and dental sectors with more than 75 print and online magazines, 60 events on six continents, and an extensive offering of books, maps, websites, research and database services. A century-old tradition of excellence, integrity and professionalism fuels our steadfast commitment to cutting-edge coverage of the changes, trends and technologies shaping the industries we serve.

WWW.PENNWELL.COM

SPEED YOUR TIME-TO-MARKET

YOUR TOTAL SOLUTIONS PARTNER



1 Command & Control

Single Board Computers
VPX6-185



2 System Connectivity

Ethernet Routers
VPX3-685 Secure Router



3 Flight Control

Multi-Platform Mission Computers
MPMC-9350 & MPMC-9310

Do you need innovative solutions or complete integration services for high-density data processing now? From board-level products to fully integrated systems, we provide advanced technology solutions that perform under the most rugged operating conditions. Speed your time-to-market and lower your overall program development costs using our leading edge, commercial-off-the-shelf products (COTS), or modified COTS (MCOTS) and engineering services. **Ask your representative about the new VPX System specification, OpenVPX™.**



4 Graphics Display

Video Input & Output
XMC-710



5 Radar Processing

Digital Signal Processors
CHAMP-AV6



6 FPGA Processing

VPX3-450

CURTISS WRIGHT Controls
Embedded Computing



sales@cwcmbedded.com

cwcmbedded.com

ABOVE & BEYOND

BOARDS & SYSTEMS